INJURY BULLETIN

Queensland Injury Surveillance Unit

No 92 July 2006

Rural/Farm Injury in Queensland

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QISU collects and analyses data from emergency department injury presentations on behalf of Queensland Health. Participating hospitals represent three distinct areas of Queensland.

QISU publications and data are available on request for research, prevention and education activities.

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Summary points

- Farms are associated with high rates of injury to both workers and non-workers.
- Children account for 21% of all farm injuries.
- Horse related injury is the most common cause of injury, representing 17% of all farm injury and over one third of serious farm injuries.
- Motorbikes and All Terrain Vehicles (ATVs) are the next most common cause of injury (11% of farm injury), predominantly young males.
- The majority of farm fatalities are due to tractor related injuries (rollovers or run-overs).
- The farm environment and work procedures should be reviewed regularly to identify potential hazards.
- Fence an area adjacent to the farmhouse to provide a safe play area for young children.
- Legislation should be introduced requiring helmet use when riding horses or using motorbikes and ATVs.
- Children should not use adult sized ATVs.

Introduction

Farming is known to be associated with high rates of injury. Fatal injury in farm workers in Australia has been estimated to be 4 times greater than the overall occupational fatality rate[1]. Farm injury results in over 1000 hospital admissions a year in New South Wales[2]. Other researchers have estimated that in QLD, 10% of workers on farms are injured every year[3].

Farms have a number of potential hazards including animals, machinery, water and poisons. Injuries may result from recreational activities that utilise the rural environment, notably horse riding, and motorbike and all terrain vehicle (ATV) use. Farms are often both home and workplace, and therefore children are at greater risk than if they were at home in a non-workplace environment.
This bulletin describes injuries that occur on farms and discusses specific prevention strategies. The term "farm" is used throughout this bulletin and is intended to cover a broad range of environments, including "rural" and "country" properties.

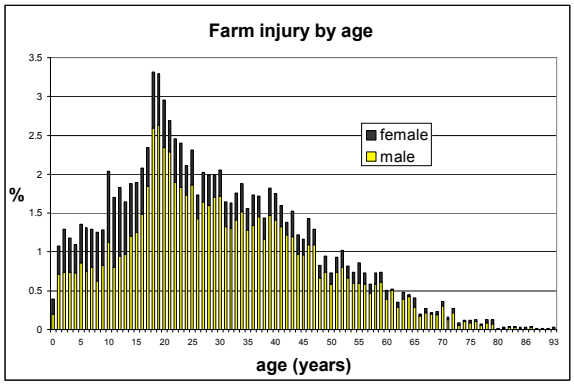
Methods

QISU collects data from Queensland hospital Emergency Departments that covers a quarter of the population with approximately 80% ascertainment.
Participating Emergency Departments serve a proportion of rural and remote Queensland.
Data for this bulletin was gathered by searching QISU database for injuries occurring on a farm, in or around a farm house or to an agricultural worker for the eight year period from January 1998 to December 2005.

Results

There were 6895 injuries over the eight year period. The rate of injury has not changed significantly over the time period with an average of 860 injuries a year.
The mean age of those injured was 29 years, median age 26 years (Figure 1). Seventy six percent of those injured were male. Twenty one percent of those injured were children (aged less than 15 years).

Figure 1



Type of injuries sustained

A wide range of injuries were sustained including; open wounds (23%), fractures (16%), sprain/strains (14%), abrasions/contusions (11%), eye injuries (10%, including 6.6% foreign bodies), intracranial injuries (3% including concussion) and bites (3%).

Body location injured

Upper limb injuries were most frequent, representing 34% of all injuries (including 17% hand and finger injuries). Lower limb injuries were seen in 25% and head and face injury in 11%.

Activity when injured

The type of activity being undertaken when injured was described as working in 68%, sport or leisure activities in 27% and in personal activities in 5%.

Mechanism of injury

The most common mechanism of injury was a fall (28%). Contact with an animal was responsible for 10% of injuries, with bites and stings causing a further 4.5% of injuries.

Severity of injury

Thirty one percent of patients were triaged as "urgent" or above (requiring treatment in 30 minutes or less) on arrival to the ED. Admission to hospital was required for 21% of those presenting to ED.

Critical Injury

Thirty six patients presented with critical injuries requiring immediate resuscitation. The median age of these patients was 14.5 years, and 80% were male.

Two patients died in the ED, one 3 year old who drowned in a dam and a 22 year old who died when the tractor he was driving collided with a train.

The injuries sustained were: head injuries in 35%, multiple injuries in 24% and limb injuries in 15%. These critical injuries were associated with a diverse range of items and activities, with a horse being involved in 38% of cases (see Table 1). The 13 horse injuries included 7 falls and 6 kicks.

Table 1

Major Injury Factor	
Horse	13
ATV/Motorbike	4
Medicine/Drug	3
Tractor/Harvester	3
Car	2
Snake	2
Building	2
Plane/Helicopter	2
Cattle	1
Fixed machine	1
Tree	1
Fence	1
Dam	1

Horse injuries

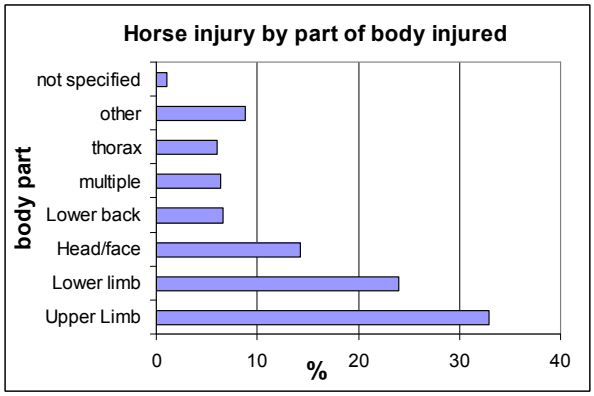
There were 1203 injuries (17% of all farm injuries) resulting from contact with or the use of horses. Horse related injuries on a farm make up 42% of all horse related injuries.

The median age of these people was 21 years, 51% were female. In 43% of cases those injured were described as working. Admission was required in 32% of cases, with 45% being triaged as 'urgent' or above.

Falls were the most common mechanism of injury (62%), with a further 28% resulting from "contact" with a horse. Thirty percent of injuries were fractures, 20% were sprains and strains and 8% were concussion or more serious intracranial injury. Limbs were the most common body part injured (Figure 2).

A kick from a horse was responsible for 60 injuries to children (approximately half of these injuries were to the head or face). These injuries were generally more serious, with 57% requiring hospital admission and 72% being triaged as 'urgent' or above.

Figure 2



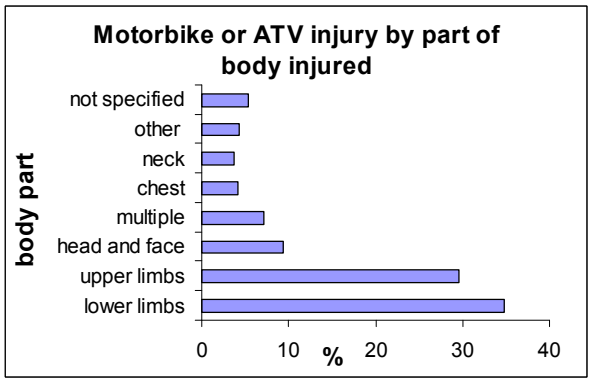
Motorbike and ATV injuries

There were 743 cases of injury attributed to motorbikes or ATVs (including 3 and 4 wheel bikes). This represents 11% of all farm injuries. The median age of these patients was 19 years, and 87% were males.

Twenty nine percent of motorbike or ATV injuries were triaged as 'urgent' or above, and 26% required admission to hospital. Most injuries were described as a fall from a motorbike or ATV (55%).

The injuries sustained were fractures in 25%, sprains and strains in 20%, open wounds in 17%, concussion or more serious intracranial injury in 5% and burn in 5%. Limb injury was the most common site of injury (see Figure 3).

Figure 3



ATVs (three and four wheel bikes) were involved in 30% of these injuries. The injuries did not differ significantly from standard motorbike injuries with respect to severity, injury type or body location of injury. Thirty five percent of those injured on ATVs were less than 16 years old.

Other animal injuries

A further 8% of injuries (522 cases) were related to other animals. The majority of these injuries (425 cases - 81%) – were attributed to cattle. There were only 2 injuries attributed to sheep, 42 to pigs (50% were caused by a bite, 26% by a gore), and 75 to dogs.

Those injured by cattle had a median age of 29 years and 85% were males. 28% of the cattle injuries were triaged as 'urgent' or above, with 26% requiring hospital admission.

The injuries attributed to cattle were 19% fractures, 19% sprains and strains, 17% open wounds and 13% crush injury. Upper limb injuries were sustained in 34% of cases, lower limb injuries in 32%, head and face injuries in 14% and chest injuries in 9%.

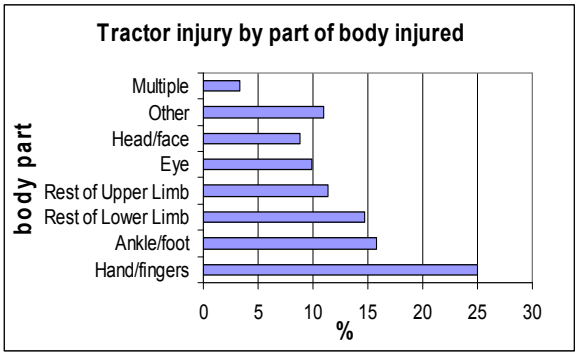
Tractor injuries

There were 274 injuries attributed to tractor or harvester use. This represents 4% of all farm injuries. Males represent 94% of these patients and have a median age of 38 years.

Thirty four percent of these cases were triaged as 'urgent' or above, with 19% requiring hospital admission. Tractor injuries were reported to result from contact with an object in 32%, cutting in 18% and a fall in 18%. Tractor injuries were most commonly open wounds (28%), sprain or strain (17%), fracture (15%) and foreign body (FB) in the eye (10%). The hand and fingers (25%) were the part of the body most commonly injured see Figure 4.

Tractor roll over was reported in 15 cases, with 6 patients requiring admission to hospital.

Figure 4



Snakes, spiders and insects

There were a total of 211 cases of injury by snakes, spiders and insects; this is 3% of all farm injuries.

There were 78 cases of snake bite. Triage scores of 'urgent' or above were assigned in 94% of cases, with 70% requiring admission to hospital.

There were 57 cases of tick bite, 46 cases of bee or wasp sting and 30 cases of spider bite. These bites and stings were assigned triage scores of 'urgent' or above in 24% of cases, and 9% were admitted.

Immersions

There were 4 cases of drowning or near drowning presenting to participating EDs during the study period, (two 1 year olds and two 3 year olds). Three immersions occurred in a dam on the farm, with the other occurring in the bath. All had a triage category of 'urgent' or above, one of these patients died in the ED and the other three were admitted to hospital.

Injuries to children

There were 1417 children (age < 15 years) injured (21% of all farm injuries) during the study period; 58% were male. Forty percent of these children were triaged as 'urgent' or above, with 28% requiring admission to hospital. Children most frequently sustained a fracture (23%), with open wounds in 20%, intracranial injury (including concussion) in 7% and burns in 5%. Children's injury often involved a horse (25%), motorbike (13%), other animal (4%), bicycle (4%) and a fence or gate (4%).

The factors involved in the critical injuries to children are detailed in Table 2.

Table 2	
Critical Injury, age <15 yrs	
Major Injury Factor	
Horse	7
Motorbike	4
Snake	2
Car	1
Fence	1
Burn	1
Dam	1
Fixed Machine	1

Eight injuries to children occurred during paid work, with a further 96 injuries (7%) reported to have occurred while performing unpaid work.

There were 346 injuries to children aged less than 5 years (5% of all farm injuries), with 54% of these injuries occurring outside the home. The injuries occurring outside the home were mainly falls (35%). These injuries involved horses (20% of injuries), other animals (10%), fence or other structure (9%), machinery or tools (6%), motorbike or ATV (6%).

Discussion

The rate of work-related death on farms in Australia is estimated to be 15.2/100 000 workers, with a 50% reduction over the last 10 years[4]. The rate of work related farm injury has been estimated at 3.05 injuries per 100 000 hours worked[5]. In Queensland, farming was responsible for 1725 workers compensation claims in 2005. Compared with other industries in Queensland, farming has the 4th highest workers compensation claim rate[6]. The calculated injury rate of 34.3 claims/1000 employees/year is likely to be a significant underestimate of injury. It is likely only the most serious injuries result in a WorkCover claim as employers are responsible for the first 5 days of an employee's sick leave. In addition many farmers may not participate in WorkCover as they are self employed.

In rural central Queensland in 1995-1996 (using ED and GP data) the rate of injury was estimated as 113 injuries/1000 workers/year. Approximately 60% of these were occupational injuries and less than 20% of these resulted in a claim for workers compensation[3]. We estimate that farm injury is responsible for approximately 500-600 admissions per year in Queensland.

Horse injury

Horses are used on farms for both occupational and recreational purposes. In Australia approximately 20 people a year die from horse related injury, with Queensland having the highest per capita rates of both death and hospital admission[8]. Approximately 7% of work related deaths on Queensland farms are associated with horses[4]. Factors associated with horse related injury are inexperience, young age, and lack of helmet use[9, 10]. Horse riding injuries are often serious. In children, injury severity has been calculated to be greater than bicycle injury and passenger motor vehicle injury[9].

It is important to note that while most injuries followed a fall from a horse, around a quarter followed contact with a horse. This suggests that injury prevention should be directed at both horse riding and to activities occurring in proximity to horses.

Motorbike/ATV

Like horses, motorbikes and ATVs are used for both recreational and occupational purposes on farms. ATVs are three- or four-wheeled motorised vehicles designed for off-road use. They were originally designed in Japan as farming vehicles but have evolved into multi-purpose work and recreational vehicles widely used in a range of industries. All ATVs now sold have four wheels. The ATV has become increasingly popular on Australian farms with 17,000 being sold in 2005, up 16% from 2004[11].

Motorbikes and ATVs are both associated with serious injury and death. Occupational use of motorbikes and ATVs is involved in 7% of work related farm death in Queensland [4]. In the last 12 years at least 12 Queenslanders have died while riding an ATV on a farm[12]. We have shown that motorbikes are involved with twice as many injuries as ATVs, but we do not have information on vehicle use or circumstances of use. Data from the Farm Motorcycle Research Project suggests that riders of 2 wheel motorbikes are far more likely to sustain an injury[13]. This survey also found that 64% of riders reported not wearing a helmet on their farm motorbike.

A national ATV Deaths Database has been established[14] which suggests that nearly two thirds of fatalities occurred during agricultural activity, with machine rollover associated with 39% of deaths. Recognised risk factors for ATV injury include age less than 16 years (where ATV use is associated with fatal rollover and injury to children[15]), male drivers, 3 wheel ATVs, inexperience, no helmet use, and greater engine size[16, 17].

Cattle

Workers compensation data in Australia show a claim rate of around 150 cattle related injuries a year, with most workers being struck by a moving animal[21]. Our data suggests that this is likely to be an underestimate. There is little information available on non work related cattle injury.

Tractor injury

While we found that tractors were involved in only 4% of all farm injury, tractors are the most common cause of farm work related fatalities[1]. In Queensland 31% of farm worker fatalities occurred during tractor use[4]. The mechanism of fatal tractor injury is usually tractor rollover or tractor run over[1]. Tractor rollover fatality is associated with the absence of rollover protective structure (ROPS). 28 people died between 1990 and 2000 in Queensland as a result of incidents involving tractors without ROPS[18]. In 2003 it was estimated that Queensland had 40000 tractors on farms without ROPS[18].

Snakes

There are no Australian studies detailing the incidence of snake bite on farms. The incidence of snake bite in Australia varies greatly, and rates are much higher in tropical regions[22]. While snake bites are a small percentage of total farm injury they are potentially very serious, reflected in the admission rate of 70%.

Immersion

While few immersions were identified from our database, it is likely that this under-represents this mechanism of injury. Immersions in rural areas are unlikely to present to the Emergency Department for 2 reasons. Firstly, fatal immersions rarely present to Emergency Departments. Secondly, patients who sustain rural immersions which are relatively brief and survived may not attend an Emergency Department.

An analysis of fatal drowning in Queensland shows that 13 children drowned in a dam over a 5 year period (2000 to 2004)[19]. In addition to these fatalities further children drowned in other natural water hazards and domestic swimming pools in rural locations. Previously we have reviewed children's drowning in Queensland[20], finding that around a third of fatalities occurred in 'rural' settings (dams, ponds, rivers, creeks, irrigational channels, cattle dips and troughs). Recent flooding was a commonly cited factor in drowning cases in rivers and creeks and other rural water hazards such as irrigation channels.

Children

Children are at high risk of injury on farms for the following reasons:

- Environment – children are potentially exposed to a workplace environment in their home.
- Child development – children are more at risk of injury because of their small size, curiosity and inability to evaluate dangers.
- Child care – younger children will often be cared for by adults who are simultaneously trying to work on the farm.
- Older children are part of the farm workforce – potentially placing them in hazardous situations that are beyond their physical and cognitive capabilities.
- Recreational activities – motorbike and horse riding are common activities on farms.

In Australia it is estimated that 30 children a year die from injuries sustained on farms[7]. In Queensland it has been suggested that the rate of fatal child farm injury is reducing[4], however hazards continue to exist for children on farms. At least 40% of farms in Queensland with children under 5 do not have a secure fenced area for play[5]. More than half of parents allow their children to ride ATVs, and two thirds allow children to ride as passengers on ATVs[7]. Around 50% stated their children did not always wear helmets on motorbikes and ATVs, and 30% stated this in relation to horses[7].

Prevention

There are a number of organisations that are dedicated to the prevention of farm injury including Farmsafe and the Department of Industrial Relations, Workplace Health and Safety, Queensland Government (see Resources). The farm environment and work procedures should be reviewed regularly looking for injury hazards (eg using a farm safety checklist).

Horse related injury

Key prevention measures include:

- The use of equestrian helmets (correctly adjusted and fitted helmets which meet the Australian and New Zealand Standard).[28] These helmets have been shown to be effective at preventing head injury.[29, 30] We believe legislation should be introduced requiring helmet use for horse riding. Children should wear helmets while tending to horses, as head injury occurs in this setting too.
- Supervision and rider education.[31]
- Selection of an appropriate horse to match rider ability.[31]

Motorbike and ATV related injury

Operators should be trained in safe operating procedures. Few people are currently accessing training courses, a recent study of teenagers showing that 97% of riders had no formal training[35]. Safe operating procedures include but are not limited to:

- Specifying conditions of operation for ATV use (including speed, "no-go" areas, suitable jobs)
- No children (under 16) using adult size ATVs.
- No passengers on an ATV.
- Wearing appropriate clothing, boots (not thongs) and a helmet.
- Operator training including adopting an active riding style; ATVs require an active riding style (transferring the rider's weight from side to side and forwards and backwards to counter balance the ATVs directional mass).[7, 15, 16]

In addition we believe legislation should be introduced requiring the use of a helmet whilst using an ATV or motorbike on a farm.

Cattle related injury

The prevention of cattle related injury is described in detail by Fragar and Temperley[33]. Key elements are:

- Understand principles of behaviour for all animal types and breeds kept on the farm and use this knowledge to guide preventive measures.
- Select efficient and safe yard and pen design.
- Use appropriate protective equipment (especially steel capped boots).
- Close supervision of inexperienced workers/ helpers.
- Separation of children from cattle.

Tractor related injury

The prevention of tractor related injury has been well documented [36, 37, 38]. Some key recommendations include:

- Rollover protection and seatbelt use. In 2003 the Queensland government introduced legislation requiring ROPS to be fitted to all wheeled tractors manufactured after 1981. This is being phased in over a 4 year period with a rebate system included[39]. A similar scheme in Victoria has successfully reduced the numbers of unprotected tractors and appears cost effective[40].
- Don't start a tractor when on the ground and don't get off a moving tractor.
- Keep children away from tractors and machinery and don't take passengers on tractors.
- Ensure all guards are fitted (especially to the power take-off) and the tractor is regularly maintained.
- Use hearing and eye protection and wear long hair tied up.

Snake bite

Most snake bites occur when people move too close to a snake, for example trying to touch or kill one.[34] Remember:

- Avoid contact with snakes.
- Ensure that the house has screens on doors and windows and keep these closed.
- First aid: Any case of real or suspected snakebite should be treated seriously. Keep the patient still and calm. Apply a firm bandage over the bite area and bandage the whole limb. Use splints to immobilise the limb. Do not cut or wash the wound, or apply a tourniquet. Proceed to the nearest hospital emergency department without delay.

Immersion

- Provide a fenced, safe area for young children to play that does not allow access to water hazards such as dams, troughs, dips or ponds.
- Secure tank covers so that children cannot fall into rainwater or septic tanks.
- Provide a 4-sided fence for the swimming pool. Current legislation requires this for all new pools built since 2005. Prior to 2005 pools on large/rural properties were exempt from fencing requirements.
- Teach children about the dangers of diving or jumping into murky water and swimming in irrigation channels/ flood waters.[32]

Injury to children

Injury prevention strategies are available [24, 25, 26, 27] and include:

- Fence a play area adjacent to the farmhouse. Create a safe play area for young children by separating them from hazards using passive physical barriers (child resistant fence and self closing gate)[23].
- Designated child care by a competent adult. Attempting to supervise young children while working is not safe. It is recognised that childcare is difficult to access in rural areas and a system for access to/ remuneration for child care in rural settings needs to be addressed.
- Helmet use, supervision and education for motorbike/ATV use and horse riding.
- Educating children about out of bounds areas on the farm.
- The use of child restraints in vehicles.
- First aid and resuscitation training for adults.

Recommendations

- Fence an area adjacent to the farmhouse to provide a safe play area for young children.
- Develop systems to address inequity in access to child care for farming families.
- Regularly review farm environment and work procedures to identify potential hazards.
- Remuneration should be provided to farmers for modifications that reduce exposure to risk, for example childcare, child resistant fencing and ATV training.
- Legislation should be introduced requiring helmet use when riding horses or using motorbikes and ATVs

Acknowledgements

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Resources/Links

- Queensland Government, Dept of IR, Workplace Health and Safety: http://www.dir.qld.gov.au/workplace/subjects/rural/index.htm
- Farmsafe Queensland: http://www.farmsafe.org.au/index.php?id=2
- AgForce Queensland: http://www.agforceqld.org.au/index.htm
- Queensland Farmers' Federation: http://www.qff.org.au/
- 15 minute farm safety checklist Nov 2005: http://www.worksafe.wa.gov.au/newsite/worksafe/media/farmhazd0042.pdf
- The National Farm Injury Data Centre: http://www.acahs.med.usyd.edu.au/nfidc/index.htm
- Queensland snake information: http://www.dir.qld.gov.au/workplace/subjects/rural/animal/snakes/index.htm
- Queensland Safe Communities Support Centre http://www.safecommunitiesqld.org/

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