

Slips trips and falls in the Dairy Farming Sector

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Introduction

Slips, trips and falls (STF) on New Zealand dairy farms cost ACC \$1.2 million a year. The full costs to farmers will be between three to twelve times that amount. The extent of the problem was recognised by ACC, OSH and the Health Research Council who jointly commissioned a series of studies to establish the nature of these STF incidents, and to develop interventions to reduce their incidence and severity. The study used an Action Research model, whereby each stage informed the next.

The study aimed to address gaps in knowledge about risk factors for STF in the dairy farming sector. There were three major research phases: an exploratory phase (to determine key areas of risk within each industry sector); an analysis phase (detailed analysis of STF incidents, tasks and additional general STF information); and an intervention phase (design and initial evaluation of control measures). This report outlines the main findings from each phase of the project.

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1. Exploratory Phase

Phase 1 focused on identifying high STF risk areas for dairy farming. This was achieved through a descriptive epidemiological analysis of ACC claims for dairy farming STF for the two-year period, 2000-2002.

Some 475 cases with sufficient data to identify them as STF cases were analysed. Low STF incidence was observed from the April to June 'drying-off' period when milking stops and many farmers take time away from the farm. Regionally, STF occurrence was heaviest in the Waikato (36%), reflecting the high density of dairy farming there. Just 21% of claimants were under 31 years of age, supporting the findings from STF research overseas that older workers more frequently incur falls. Females comprised 28% of dairy farming STF claimants, reflecting the role of female farm owners, workers and family members in this sector.

STF cases occurred most commonly in the milking shed and yard, and then paddock. A significant proportion occurred while climbing on or off a vehicle or other piece of equipment. Injuries that followed a fall from a vehicle resulted in a larger proportion of fractures than other events, suggesting this injury mechanism results in more serious injuries than other STF on dairy farms. Falls onto concrete in particular were more likely to be serious.

Dairy farming STF were most frequently foot slip events, rather than trips or jumps leading, for example to ankle injuries. Findings from semi-structured exploratory interviews pointed to a range of surface contaminants, including manure, mud, water, milk and cleaning alkaline, along with sloped and stepped surfaces, as perceived slip risks in the milking shed.

2. On-site Investigation Phase

The exploratory work informed the next stage of study in which follow up investigations were conducted with ACC claimants on 39 farms. The regions visited, in order of frequency were: Waikato, Taranaki, Canterbury, Bay of Plenty, Northland, and Otago. The aim of this phase was to identify individual, task, footwear and equipment, design and work organisational factors and analyse their interactions for the purpose of identifying potential interventions.

The main methodology for this research phase was detailed STF incident follow-up investigations, involving a detailed face-to-face semi-structured interview with the injured worker, site observations, plus photographic evidence where needed.



Figure 1. Observing the site of an injury event

Injured dairy farmers and employees were all ACC claimants, and were identified from the ACC claims database (from selected incident categories) for dairy farming claims for the 12-month period to the end of June 2003.

Of the 143 letters sent to ACC claimants who had made claims for STF injuries, 32 (22%) respondents agreed to participate in the study (six respondents provided information about more than one STF). This result is considered to be reasonably good given the sensitive nature of the study and the fact that small business surveys commonly experience relatively low response rates. 39 on-site investigations were conducted in Northland, Waikato, Bay of Plenty, Canterbury and Otago.

Injury events and circumstances were recorded on modified Events and Contributory Factors Charts (Haslam and Bentley, 1999) which detailed events from 'activity immediately preceding the STF' to 'post injury event'. Incident-independent information on respondents' perceptions of general STF risks on dairy farms were also collected during the semi-structured interviews with the worker who had been injured.

Table 1 outlines the specific activities being undertaken at the time of the STF:

Table 1.

Activity	Number of cases
Climbing on or off vehicle, trailer, fence or wall	10
Walking - various tasks – looking elsewhere	9
Moving quickly due to cows - chasing or heading off	8
Working at height - fall	5
Going up or down steps	3
Handling a heavy or awkward heavy object	3
Working inside slippery vat – angled floor	1

Slippery surfaces in the milking shed were perceived by subjects as the most hazardous element for STF on the farm. But through the investigation, other important elements were acknowledged as being commonly present including:

- Rushing (usually running or turning fast)
- Divided attention (distraction away from watching where feet are being placed)
- Use of worn footwear or footwear unsuitable for the surface characteristics (Figure 2)
- Plant or equipment design factors (e.g. steps built with inconsistent geometry of risers and/or tread depth).



Figure 2. Worn boots



Figure 3. Trip hazards introduced where a fore-end loader has been added.



Figure 4. Trip hazards are common when using the right hand door of a tractor - especially for wearers of overtrousers.

3. Intervention Development

Using the results of the exploratory and on-site investigation phases, 32 potential intervention ideas for further discussion were developed. These were wide ranging across the work system covering: plant and equipment design, work organisation, environmental design, training and hazard awareness, footwear – surface interaction. These outlines were developed into detailed interventions in a number of key areas.

The researchers also attempted to build on strategic injury prevention knowledge gained collectively in this country. The New Zealand Injury Prevention Strategy (June 2003), notes that “Injury prevention in NZ worked best when it:

1. Addresses the multiple factors that contribute to injury
2. Encourages environmental and behavioural changes
3. Engages the people who are most at risk
4. Involves action across sectors
5. Is sustained and reinforced over time.

The researchers therefore worked closely with personnel from the very successful FarmSafe programme during 2004, on how to best utilise the knowledge gained from this study.

The full findings from this project were set out as an *Action Plan* refer publication reference on Page 8 - Moore, D., Tappin, DC., Bentley, TA., Ashby, L., Parker, R.J. (2005). This will assist FarmSafe, the Agriculture Health and Safety Council (AgHSC) members and others in the industry in taking the next steps. The interventions were organised into category tables and prioritised within each table, starting with those that the researchers consider to have the greatest potential to reduce STF injuries and fatalities. The following tables outline some of the key recommendations and actions for each category of interventions in the *Action Plan*.



Figure 5. Concrete pit steps with generous tread dimensions are good for gumboots.

3.1 *Action Plan* - Physical Environment

<p>Step classification Steps around sheds are currently classed as Service Stairs, which can be steeper than steps generally found in outdoor areas by people moving at speed in muddy boots public (compare metal steps in Figure 6). This encourages dairy shed workers to jump down the steps. The classification used by the Building Inspectorate should be changed.</p>	
<p>Nosings and riser heights Tripping over aprons or nosings when going up is common as the stairs are often too steep (see above). To make this worse, the top step is often up to 50mm higher than the others as a nib as added for surface water control. Riser heights should be kept to a minimum acceptable level to provide shallow flights.</p>	
<p>One-person operation Milking shed systems need to be designed to make solo operations smoother - minimising the need to rush. Good new and retrofit designs should be promoted.</p>	<p>Figure 6. All three treads on this flight are different sizes. In descent, only the heel would fit on the bottom two steps.</p>
<p>Acceptable textured surfaces There is inconsistency regarding acceptable texturing of surfaces. A selection of surface specifications should be tested and approved so that farmers can use textured surfaces other than brushed concrete, and know they are acceptable to the Inspecting body - improving slip resistance while still meeting hygiene standards.</p>	
<p>Handrails All milk rooms should have handrails on steps (even if less than 1200mm total rise) in recognition of the additional hazards from ill-fitting protective clothing or footwear and the wet, contaminated trends.</p>	
<p>Yard design Improvements to yard design to minimise unpredictable behaviour by cattle, and the ensuing effects should be made: periodic reviews are needed to collect and publicise good ideas through trade press releases.</p>	
<p>On-farm communication Communication between staff about hazards identified during the day should be improved. Methods found to work include a double-up of job board or book with daily hazard list in the workshop where personal gear is left.</p>	
<p>Hose design and stowage arrangements Tidy storage should be quick and easy to achieve. Promote systems available in NZ and good DIY ideas from users.</p>	
<p>Maintenance Encourage the addressing of STF through preventive maintenance and good housekeeping. Publicise the cost benefits and results, from farmers who have made successful changes.</p>	

Grazing management

Research and promote good practice in the grazing sequencing of paddocks to minimise frequency of staff having to move quickly across difficult churned-up surfaces.

Surface water

Inform farmers of the cost benefits of preventing ruts and holes, especially around gates and dips in races, through erosion control and drainage.

Waste management

Recommend the use of skips, bins and well defined fill holes to contain waste. Discourage loose tips on flatland where debris can spread and cause STF and damage to plant and animals.

Alkaline

Consider using coloured alkaline for cleaning surfaces that are walked on so that increased slippery areas are apparent.

3.2 Vehicles and Plant - key recommendations and actions

Trailers

Most trailers and towed implements need to be climbed up on at some point to fill, load or inspect, but few are designed with realistic systems for this that are safe in wet muddy conditions. Minimum standards of design are needed that anticipate this aspect of their use.

Tractor cab access and egress

Guidance is needed on good design of systems (footplates, handholds) for access/egress, mounting or alighting from tractors and other large pieces of plant. This is of particular importance for those retrofitting machines with new devices such as fore-end loaders as the original means of access will get obstructed and potentially made far more hazardous. The case study below relates to this.

Story 5.

Early in the season on a muddy day, a Northland farmer came back for breakfast at 10am. He caught his right toe on the loader frame getting off, left foot slipped off foot plate, and he landed on his face and knee on the ground. Knee swelled up straight away, went to the doc 2 weeks later.

Other factors:

- He came down forwards – not back.
- The tractor was parked across a slope and the step was on the downhill side and also muddy.
- Loader frame obstructed descent.
- Boots were overlong to get width.
- Delayed medical attention.

What it cost:

- 18 months on two walking sticks.
- Can no longer carry weights.
- Knee replacement needed.
- Can't return to farming.

Lessons learned:

- Modified machines may need new handholds fitted for getting on and off.
- Always face the machine getting on and off
- Avoid ill-fitting clothing and protective gear wherever possible.
- Get medical advice asap.

In 62% of dairy STF there are weaknesses in plant and personal equipment design



Figure 7. Example of a Case Study

3.3 Work Organisation - *key recommendations and actions*

Managing busy periods

Develop case studies on farmers who have tackled the problem successfully with practices such as: getting competent cover for staff in the event of injuries; prioritising tasks to minimise goal conflicts for workers; reducing rushing and short cuts and keeping the jobs sustainable.

Stress

Include formal discussions on sources of stress, (e.g. managing busy periods, likely symptoms, common outcomes and techniques to manage it) as part of FarmSafe courses.

3.4 Personal Equipment - *key recommendations and actions*

Boot selection and replacement

Promote basic boot selection guidelines for farmers (Figure 8). Emphasise that useful life ends with significant wear – not leaks. Run a comparative study on boots for dairy farming use, combining objective testing and controlled field trialing. Update guidance on selecting the best footwear to match tasks and environments via the trade press, as new products become available.

PPE that fits

Commission a study to estimate the nature and extent of injuries and productivity losses through ill-fitting PPE in the industry. Encourage a wider range of personal protective equipment (PPE) sizes - matched to user requirements, to be made available by suppliers.

New boot ideas

Many farmers wear gumboots for every task. Reasons for this are: cost, wet pastures soak leather work boots, and speed to get on/off. Manufacturers should be encouraged to develop competitively priced boots that provide ankle support as well as water resistance for wearing in lush but lumpy paddocks.

Emergency communications

In areas without mobile phone coverage, there is a need for greater availability of lightweight and affordable communication systems that work for people who get injured when working alone. Conduct study and inform farmers of options, via the media.

Tread wear indicator

A tread wear indicator may assist timely footwear replacement. The cost of providing an indicator layer varies greatly depending on the method of boot manufacture.

3.5 Training and Awareness - *key recommendations and actions*

Resourcing, monitoring and an Industry Strategy

Establish regular reporting of key injury and fatality statistics to AgH&SC from ACC, Dept of Labour and Farmers Mutual. Consider guaranteeing sustained funding to initiate and sustain projects (such as schools work).

Risk Perception

Study findings suggest that farmers underestimate actual injury costs. More case studies are needed to demonstrate the full long term effects of injury on farmers' lives (Figure 5). To engage the people who are most at risk, case studies should use examples where people have moved from high risk to low risk by: deciding action is needed, consciously identifying environmental and behavioural factors and successfully controlling these.

What to look for in boots

Self cleaning. When the foot flexes the mud and small stones should fall out from between the treads.

Soles should be flexible. Hard inflexible ones will act like ski's when on wet milking shed floors. Softer more flexible soles with good width provide the most contact area with the ground and give best traction.

Fit. Find one that fits your foot, as getting a bigger size just for width often leads to tripping - on steps and when getting out of tractor cabs.

Get the right boots for the job.

For the shed: a tread design with lots of elements – but not so smooth and small that they don't cut through mud and muck to contact the surface. 'Deck shoe' type treads are just for wet surfaces like yachts – not mucky ones.

For the paddock: heavy tread that grabs boggy turf when walking and has ankle support to protect against rolling on unseen ruts

**Replace shed boots every 6 months -
or sooner if your tread gets worn spots**



Figure 8. Boot selection and replacement guidelines - Taken from the Resource Studies set produced for FarmSafe

3.6 Emphasise Productivity Gains

Medical help

Conduct study on the benefits of getting timely medical attention. Discuss affordable ways of getting earlier medical attention (e.g. teledoctor) for people in more remote locations. Distribute guidance via trade press.

Chainsawing, building and maintenance

Alert farmers to training resources available on safe and effective practices in the ancillary jobs they do on the farm, including: tree pruning, roof maintenance and high level painting.

Cows 101

New staff should be provided with formal induction on OSH training. Resources to be developed, to include: milking shed hazard management responsibilities, the importance of breaks, age limitations, coping with seasonal pressures, recognising and dealing with stress and fatigue, footwear (choice, use, maintenance and replacement), moving at a pace to suit underfoot conditions and the risks from divided attention.

4. Conclusions

This report builds from an improved understanding of the 'multiple factors', and it identifies targets for both environmental and behavioural change. However, for the interventions to be: across sectors, and sustained and reinforced over time requires a coordinated approach, industry influence and long-term commitment. Our overall recommendation is that the Agricultural Health and Safety Council take on this report and incorporate the findings into their National Guidelines and Strategies. The *Action Plan* refers directly to the Workplace Health and Safety Strategy (WHSS) for New Zealand to 2015, and its immediate Action Plan (2005/6). Of note is that if followed, the elements of the STF *Action Plan* presented here would make advances in seven of the eight National Priorities of the WHSS for this industry sector.

The study yielded a lot of very valuable data but as with most field exercises was subject to a number of limitations. There was a lower response rate from the younger age groups, and there is the possibility that those who did reply were those claimants motivated to be pro-active in injury prevention. Employees (who may change contact details more frequently) were not as easily contacted through the chosen sample selection route (via ACC) as farm owners. However, in previous COHFE studies, self-employed farm owners had a tendency to under-report to ACC, due to the extra paper work required to get earnings-related pay. This may have affected results of the sample. It was not possible to view the incident site in all cases, and some recall bias and error will have been a factor as investigations took place some months after the incident. However, the researchers collected data from alternative sources to triangulate subjective to corroborate recall findings wherever possible.

The strengths of the study were that it yielded detailed contextual and task data in combination for pattern matching and intervention identification that could not be gleaned without such in-depth site work. It also provided task understanding that enabled the researchers to frame more informed discussions on potential side effects that may arise from some of the interventions ideas raised. Without this knowledge, one hazard can simply be replaced by one or more different hazards.

While the possibility of injury is understood by farmers, the true long-term consequences for families and careers are almost certainly underestimated. We recommend strongly that in accordance with the Framework presented in the Workplace Health and Safety Strategy to 2015, injury minimisation in future in this sector is approached as an integral element of farm and personal productivity.

Further Reading

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