

# **Effective Occupational Health Interventions in Agriculture**

## ***Report of a survey of risk factors and exposures on farms.***

Views and / or conclusions in this report are those of the project team and may not reflect the position of the funders.

**Colin Cryer  
Kirsten Lovelock  
Rebecca Lilley  
Peter Davidson  
Gabrielle Davie  
Ari Samaranayaka**

**Injury Prevention Research Unit**

**David McBride**

**Department of Preventive and Social Medicine**

**Stephan Milosavljevic**

**School of Physiotherapy**

**Kate Morgaine**

**Faculty of Dentistry**

**University of Otago**

**P O Box 913**

**Dunedin**

**New Zealand**

**9 May 2009**

**ISBN: 0-908958-72-2**

**OR076**

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## **Acknowledgements**

This study was funded and supported by the Occupational Health and Safety Joint Research Portfolio (OHS JRP), a joint initiative in Occupational Health and Safety research. The OHS JRP is in turn funded by the Accident Compensation Corporation (ACC), Department of Labour (DoL) and the Health Research Council of New Zealand (HRC). Views and / or conclusions in this report are those of the project team and may not reflect the position of the funders.

We thank AgriQuality™ and ACC for supplying the data from which the sample of farms / injured farmers and farm workers were drawn. We further thank Dave Barson and Brandon de Graaf, Data Management, Injury Prevention Research Unit, University of Otago for preparing the data for sampling, as well as preparing the survey response data for analysis. The research team would also like to thank Dianne Casey and Sue Walker for their administrative support throughout this project. Thanks must also go to the four telephone interviewers, Tina McKay, Melissa Park, Liz Ward and Raewyn Williamson for their hard work over the twelve months of data collection.

We thank Dr Ian Laird (Centre for Ergonomics, Safety and Health, Massey University) who peer reviewed a draft of the report.

Finally, we give special thanks to all the participants and respondents in the two parts of this survey.

## Abbreviations

AB	AgriBase™
AB-sr	AgriBase™ sample respondents – decision makers
ACC	Accident Compensation Corporation
ACC-sr	ACC sample respondents
ATV	All Terrain Vehicle
CATI	Computer-Assisted Telephone Interviews
CI	Confidence Interval
DoL	Department of Labour
ERC	Earnings Related Compensation
FFNZ	Federated Farmers of New Zealand
FS	FarmSafe™
IPRU	Injury Prevention Research Unit, University of Otago
n	Numerator for rates or proportions
N	Denominator for rates or proportions
nec	not elsewhere classified
NIHL	Noise Induced Hearing Loss
HRC	Health Research Council of New Zealand
LBP	Low Back Pain
MSC	Musculoskeletal complaint
MSD	Musculoskeletal disorder
ORs	Odds Ratios
PPE	Personal protective equipment
RCD	Residual current device
SCM	Safety Climate Measure
WCdays	Number of days for which earnings-related compensation was paid

# Executive summary

## *Background*

Occupational ill health in agriculture is a serious burden and costs the country millions of dollars each year. Currently, there is limited knowledge of the efficacy of methods to prevent these problems. It is important to review the problems of ill-health and disease in agriculture, their causes, exposures to risk factors, and methods of prevention - to generate new knowledge and develop the potential to address these problems.

This project identified:

- what puts farmers, farm workers and their families at risk
- what is known worldwide about the best ways to reduce occupational ill-health in this group, and
- what barriers and critical factors need to be considered when designing and implementing interventions.

There were several distinct study phases to the overall project, as follows:

1. An update of recent literature reviews.
2. A survey of the population to describe: exposure to hazards and risks, interventions already in place, and potential problems (barriers and critical factors) relating to implementation of further interventions.
3. Face-to-face interviews of selected farmers, farm workers and their families to provide a more in-depth look at the same factors.
4. Interviews of other sector stakeholders to ascertain their perceptions of occupational health issues in agriculture and barriers to effective intervention

Each of these study phases has resulted in a report and will result in further published outputs. We have also produced an overview report that makes a number of recommendations which are based on an assessment of the research findings of each distinct phase. Key amongst these is the recommendation for the most effective route for future interventions in this sector and the identification of critical factors that need



to be considered when designing and implementing those interventions. The five reports produced as a result of this work are:

- *Effective Occupational Health Interventions in Agriculture. Risks factors for Occupational Injury and Disease in Agriculture in North America, Europe and Australasia: A Review of the Literature (Report No.1)*<sup>a</sup>
- *Effective Occupational Health Interventions in Agriculture. An international literature review of primary interventions designed to reduce injury and disease in agriculture (Report No.2)*<sup>b</sup>
- *Effective Occupational Health Interventions in Agriculture. A report of a survey of risk factors and exposures on farms (Report No.3)*<sup>c</sup>
- *Effective Occupational Health Interventions in Agriculture. Stakeholders, sector dynamics, intra-sector collaborations, and emergent issues of injury and disease prevention in the agricultural sector (Report No.4)*<sup>d</sup>
- *Effective Occupational Health Interventions in Agriculture. Summary report*<sup>e</sup>

This report focuses on the survey of the population, which describes problems, exposure to hazards and risks, interventions in place, and barriers and critical factors relating to implementation of other interventions.

There have been a number of NZ and overseas studies that have described the problems of occupational injury and disease in the agricultural sector, investigated hazards and risks, as well as the effectiveness of interventions. This literature is limited in a number of areas, including in the description of levels of exposure to hazards of

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<sup>a</sup> *Effective Occupational Health Interventions in Agriculture. Risk factors for occupational injury and disease in agriculture in North America, Europe and Australasia; A Review of the Literature (Report No.1).* Kirsten Lovelock, Rebecca Lilley, David McBride, Stephan Milosavljevic, Heather Yates and Colin Cryer on behalf of the Occupational Health In Agriculture research team.

<sup>b</sup> *Effective Occupational Health Interventions in Agriculture. An international literature review of primary interventions designed to reduce injury and disease in agriculture. (Report No.2).*

Rebecca Lilley, Colin Cryer, David McBride, Kirsten Lovelock, Kate Morgaine, Stephan Milosavljevic and Peter Davidson. Injury Prevention Research Unit, Department of Preventive and Social Medicine, University of Otago.

<sup>c</sup> *Effective Occupational Health Interventions in Agriculture. A report of a survey of risk factors and exposures on farms (Report No.3).* Colin Cryer, Kirsten Lovelock, Rebecca Lilley, Peter Davidson, Gabrielle Davie, Ari Samaranayaka, David McBride, Stephan Milosavljevic, Kate Morgaine, Injury Prevention Research Unit, Department of Preventive and Social Medicine, University of Otago.

<sup>d</sup> *Effective Occupational Health Interventions in Agriculture. Stakeholders, sector dynamics, intra-sector collaborations, and emergent issues for injury and disease prevention in the agricultural sector. (Report No.4).* Kirsten Lovelock, on behalf of the Occupational Health in Agriculture Research Team, Injury Prevention Unit, Department of Preventive and Social Medicine, Dunedin School of Medicine, University of Otago.

<sup>e</sup> *Effective Occupational Health Interventions in Agriculture. Summary report. (Report No.5).* Kirsten Lovelock and Colin Cryer, on behalf of the Occupational Health in Agriculture Research Team, Injury Prevention Unit, Department of Preventive and Social Medicine, Dunedin School of Medicine, University of Otago.

workers and their families on NZ farms, and barriers and critical factors to facilitate intervention. This survey aimed to address some of those shortcomings.

### ***Aim of the overall project:***

The *Effective Occupational Health Interventions in Agriculture: key characteristics of their development and implementation in New Zealand* project aimed to update the knowledge base on injury and disease in this sector and to provide a platform from which stakeholders could work toward developing evidence based policy and practice to reduce injury and disease in this sector.

### ***Objectives of the survey:***

For farmers, farm workers, and family members living on a farm, to describe the following in relation to the farm on which they live and / or work:

- their current ill-health and injury experiences;
- their exposure to chemical, physical, biological and psycho-social agents;
- their work practices;
- farm occupational health and safety knowledge and practice;
- interventions in place, and
- barriers and critical factors relating to the implementation of interventions.

### ***Methods***

#### *The target population*

The target population comprised those directly employed in agricultural production, ancillary workers who directly support agricultural production (eg. farm workers), and the partners and other family members of employers / employees who were potentially exposed to the same work-related hazards and risks on farms.

#### *Interview method*

Telephone interviewing was employed. The variation of exposure over the farming year was addressed by staggering the period of the survey over a 12 month period (see below and computer assisted telephone interviewing (CATI) was used.

### *AgriBase™ Sample*

We used the database of farms (AgriBase™ - AB), held by AgriQuality™ as the sampling frame and used stratified random sampling. The Key strata were: (a) Sheep, (b) Beef, (c) Dairy, (d) Horticultural and other crop growing, and (e) Other Livestock. The target responder for the interview was the person who makes the decisions on the farm (e.g. the farmer, farm manager); and a family member/or farm worker (randomly assigned) over the age of sixteen years. The sample was drawn at four separate times over the year for the interviews which took place between August 2007 and July 2008.

### *ACC sample*

We repeated this survey for a sample of people who had made recent successful claims to the ACC for earnings-related compensation (ERC), for whom the duration of their ERC claim was greater than 21 days. This approximates to time off work, or restricted work activities, resulting from injury for over 28 days. We included this second sample in order to describe exposure prevalence to risk factors in those who have recently made a claim as a result of serious injury. There were relatively few serious injuries in all strata except for “dairy”, so all serious injury cases were selected for interview from each strata, except dairy which were sampled randomly. Again, the ACC sample was drawn a four different times during the year.

### *Survey questionnaire*

A comprehensive questionnaire was developed to identify injury and disease morbidity, and capture information on a range of potential injury- and disease-related risk factors, including workplace factors/hazards associated with increased risk of farm-related injury / disease, psychosocial factors that might contribute to occupational safety and health, safety climate, work status, safety practice and training, and perceived barriers to preventive intervention. We strove to use validated questions, or questions that had been used in previous surveys. The questionnaires used in recent past work that formed the basis of the survey questionnaire included the

- “Farm Workers’ Injury Study”,
- “Process and Impact Evaluation of the FarmSafe™ Awareness Programme”,
- “Farm Injury Risk Among Men (FIRM)”,
- The Houghton and Wilson farm survey published in 1994, as well as

- “The Work-related Determinants of Health, Safety and Well-being of New Zealanders”.

The questionnaire took in the order of 60 minutes to administer. The shortest interview was in the order of 30 minutes. The questionnaire was tested on a small sample of the target population before use in the full survey.

## ***Results and Discussion***

### **Sample characteristics:**

The responders from the AgriBase™ sample were the main decision maker on the property. Two hundred and fifty-three (n=253) decision makers were interviewed giving a response rate of 38% (253/657). On the whole these respondents were: mature (79% were aged 45 years plus) and experienced (73% with >20 years farming) with a self-rated high working capacity. Seventy-six percent (76%) of the respondents were male. In contrast the ACC sample responders had diverse status (decision maker, farm workers, family members). Two hundred and fifty eight people (n=258) were interviewed, giving a response rate of 39%. They were slightly younger (61% were 45 years plus) with less experience (51% with >20 years farming). Eighty-one percent of the ACC sample respondents were male. The majority of respondents were New Zealand European (90% for the AgriBase™ sample and 80% for the ACC sample) and a small proportion of respondents were Maori (2% and 8% respectively).

### **Farm characteristics**

The respondents from both samples mainly comprised sheep, beef and dairy producers. There were relatively few participants who identified horticultural activities as their primary form of income. There were a mix of farm sizes and terrains in both samples (1/3rd plains, 1/3rd rolling, 1/3rd hill, high or mixed terrain). Most farms had one or more of resident adults, and 27% (AB) and 19% (ACC) had four or more resident adults. The most prevalent of the potential hazardous characteristics were: 51%/54% (AB/ACC) had dams/ponds; 73%/76% had rivers/streams; 43%/39% had overhead power-lines; and 28%/38% had silos.

## **Occupational Diseases**

### Illness and conditions in the previous 12 months.

A cough lasting more than 3 days was the most common condition amongst the AgriBase™ sample. This was followed by noise induced hearing loss (NIHL) with prevalences of 19% (AB) and 13% (ACC). Hay fever and asthma requiring medication were also common with prevalences of 13% (AB) and nineteen percent 19% (ACC) for hay-fever, and 10% for asthma requiring medication in both the AB and ACC samples. Other common conditions included diabetes, bronchitis and pneumonia, vascular disease (heart attacks and stroke), which were similar to the general population.

### Musculoskeletal conditions.

Musculoskeletal conditions were common. Sixty four percent (64%) of the AB sample and 67% of the ACC sample reported lower back pain, and 57% (AB) and 58% (ACC) reported shoulder and neck pain. Only a small proportion of AB respondents had musculoskeletal conditions that resulted in a compensation claim being made.

## **Injury**

### Random sample of farmers

With respect to injury, thirteen percent (13%) of farmers from the AB sample had had an injury, in the three months prior to interview, which had restricted their activity for a half a day or more and/or which required medical treatment from a health professional. Generally these injuries were reasonably serious and respondents reported work capacity was poor following injury. For two-thirds of those injured, it was over a week before they could resume normal farming duties; yet only a third of these respondents made a claim to the ACC. The most frequent injuries were: sprains and strains, predominantly to the back; cuts to the head, wrist/hand or multiple body sites; crush injuries to the chest, ankle/foot, wrist/hand, shoulder/upper arm or multiple sites, and bruising to the lower leg or to multiple sites. Injuries in summer had the highest estimated crude rate (40 per 100) with spring the next highest rate (13 per 100). The majority of injuries occurred outdoors (73%), on flat terrain and nine-tenths occurred when it was fine and dry.

### Sample of seriously injured persons.

Of the seriously injured persons from the ACC sample, the majority were sprains and strains, fractures, dislocations, crush injuries, loss of consciousness, and in one case an amputation. The majority took place outdoors, on flat terrain and in fine and dry conditions.

### Circumstances of injury

For both samples, injury events involved primarily: animals, vehicles, and machinery.

### **Work environment - Physiochemical hazards.**

#### Exposures

*Vehicle vibration* was the most prevalent physical exposure (32%/43% - AB/ACC), for example whole body vibration, with shock vibration being more common in the use of all terrain vehicles (ATV's).

*Noise.* Fourteen percent (14%/20%) reported noise exposure where “noise was so loud you had to shout”.

*Dust.* Exposure to dust of biological origin (animals, plants) was the most frequently reported dust exposure (27%/39%).

*Handling hazardous substances.* Frequent (often and sometimes) handling of hazardous substances had a prevalence of just over 50% of respondents.

*Chemicals.* Herbicides were the most commonly used chemicals reported in the current survey (84%/72%). Reported exposures in this survey were 57% to 84% (AB) and 48% to 76% (ACC) across all of the specified chemical types included in the interviews, ie. herbicides, pesticides, dips and drenches, paints, oil products, fertilizers, disinfectants, detergents, rodenticides, and animal health products.

#### Protection from chemical exposure.

When working with chemicals respondents generally protected the trunk and extremities from exposure, but less commonly the face and eyes, with the use of masks and respirators.

#### Health Effects

Health effects from chemicals were reported by 2.5% of the AgriBase™ sample and 5.3% of the ACC sample.

### **Work environment - Ergonomic stressors / factors.**

Working on the farm in a sitting position (32% for AB and ACC), associated with use of ATVs, tractors and other farm vehicles puts farmers at risk of whole body vibration. Bending without support (25%/32%) and lifting or manoeuvring heavy loads (23%/37%) in twisted work postures (14%/18%) that are often described as painful and tiring positions (13%/29%) are consistent with the typical stock work that many farmers undertake with sheep, cattle, and other farm animals. The high levels of repetitive hand/arm movements (44%/62%) reported by these farmers/workers is also consistent with stock work such as drenching/shearing/crutching.

### **Work environment - Job stressors.**

The highest reported prevalence(s) associated with stress amongst the AgriBase™ sample were the unpredictable factors of machinery breakdown (50%) and having a farm-related accident (47%). Unsurprisingly, farm-related accidents were reported as the predominant source of stress by responders from the ACC sample (59%). Other dominant stressors were time pressures due to increased seasonal workload (52%), and unpredictable factors, for example, machinery breakdown (46%).

### **Work Organisation.**

#### Working hours.

Working hours were longer in spring and summer; long working hours is a known risk factor for injury amongst those working in agriculture.

#### Employees.

On-call or casual employment arrangements were common for those farms employing labour. ACC sample farms were more likely to have employees working on subcontract. Subcontracting is a practice associated with poorer occupational health and safety conditions in other industry groups.

#### Multiple job holding.

Multiple job holding was more common amongst the AB sample (34% vs. 12%) and most commonly the second job was casual or of short duration (80%).

## **Children.**

For children there were distinctive age and gender patterns with respect to exposure on the farm and to work.

*Very young children aged <5 years:* riding on farm vehicles as passengers (including ATVs), exposure to animals; and accompanying adults while they work on the farm.

*Young children aged 5-9 years:* operating ATVs and motorbikes; riding on vehicles as passengers (including ATVs); playing near machinery; access to farm structures; performing animal work; using firearms; and accompanying adults working on the property.

*Older children aged 10-15 years:* share the same exposures as those in the 5-9 year age range, only greater.

## **Selected workplace exposures – vehicles / machinery / animals.**

Respondents reported high levels of exposure to: two wheeled motorcycles (34%/33%), four wheeled ATVs (77%/74%), tractors (92%/81%), implements pulled by tractors (87%/76%), shearing equipment (50%/39%), chainsaws (86%/71%), firearms (69%/43%), workshop equipment (89%/75%), and stock (73%/60%). There appears to be greater use of ATVs and less use of two wheeled motorbikes, when compared to previous research conducted in 1993/94.

### Tractors.

Few farmers used seatbelts when driving vehicles on the farm. Leaving keys in the ignition of a tractor that was unattended was common to a high proportion of respondents in both samples. There appears to have been a significant improvement in farm safety features: ROPS, safety belts, passenger seats, guarded PTOs, and safety starters over the last fourteen years.

### Farm Bikes.

When using farm bikes (2-wheeled) only 19% of the AB sample and 11% of the ACC sample reported they always wore a helmet.

### ATVS.



ATVs tended to be used every day. Few indicated that they used a helmet when riding an ATV, approximately 50% indicated they always wore work boots, and only 2 people ever wore a seat belt. Sixty-three percent (63%) of the AB sample reported carrying passengers, 18% reported getting on or off a moving ATV, the majority 75% reported leaving their keys in the ATV when unattended.

### **Work Safety Climate.**

Workers did perceive their workplace as a contributor to their capacity to work safely. Workers were in some cases inclined to justify their unsafe practice by blaming a lack of training, or lack of correct or poor equipment in the workplace. Most considered that they had adequate safety equipment, training and support on the farm. Workers who had experienced a severe injury perceived they had less control over their workplace.

### **Training.**

With respect to training, the vast majority of respondents from both samples had not received any training in the last six months. Fifteen percent / fourteen percent (15%/14%) reported that they had received formal training for chemical use. Just over 40% of both samples had attended the FarmSafe™ Awareness Course since its inception in 2002.

### **Safety Checks.**

Few respondents from both samples had had a formal safety check on the farm in the previous six months. For those who had had a safety check on the farm, it was more likely to have occurred amongst those who had experienced a prior serious injury.

### **Barriers to safety.**

Having to rush and being tired and/or fatigued were the most prevalent barriers to safety reported by the AB sample. In addition, twenty five percent (25%) of responders reported a lack of equipment would present a barrier at least some of the time. Similar responses were evident amongst the ACC sample, but some also cited

pressure from neighbours, co-workers, or management as affecting their ability to work safely. Economic and time pressures subsume safety concerns on a significant proportion of farms.

### ***Recommendations***

Recommendations relating to all phases of this work are presented in the Summary report. They are reproduced here. [1]

1. *There is common recognition of the need for an agreed upon safety strategy that is evidence based.* In the absence of this there will continue to be coordination issues, a lack of coherence, issues surrounding the efficacy of specific interventions, duplication of effort and a concentration of effort at the macro level (with little or no involvement at meso and micro levels).
2. *A programme for the development of appropriate interventions to reduce the burden of agricultural injury and disease needs to be formulated.* It is recommended that a programme involving the development of appropriate interventions to reduce the burden of agricultural injury and disease be formulated. Any proposed intervention should be evaluated in New Zealand for efficacy in one or more trials. If found to be efficacious under controlled conditions, the proposed intervention should be tested and evaluated for its effectiveness under 'field' conditions. If the intervention effect is positive, only then would the intervention be implemented on a national basis.
3. *Addressing the key injury and poor health causes.* Interventions need to be designed to address the key exposure/hazards faced by the farming community. Targeted interventions have a greater likelihood of success.
4. *Interventions need to reach beyond educational interventions and be multifaceted.* Interventional approaches other than educational approaches need to be considered to address the multitude of mechanical, physical, biological, chemical and psychosocial hazards faced by farmers within the farming environment. Interventions that have the hierarchy of control as a keystone are most likely to succeed. We recommend the use

of a multi-faceted interventional approach where interventions should be truly multi-faceted, including combinations of relevant educational, engineering/design and regulatory interventional components, where applicable.

5. *Consideration of the barriers to implementation of interventions.* Intervention design needs to consider the barriers to implementation. For example, interventions need to address and include those farmers resistant to safety improvement in farming; those with poor health and where safety conditions are far from optimal. Steps such as identifying high risk, more resistant farmers at initiation of the intervention and providing targeted interventions for these groups may improve the outcome of the intervention. Other barriers that need to be considered: economic; different definitions of what constitutes serious injury; and different behavioural responses to ill health; addressing perceptions of difference within the sector [between the farm community and the national level stakeholders]; and ensuring that any future initiatives involve full engagement from the rural community. Dissemination of occupational health information to farmers, farm workers and their families needs to include more than written communications.
6. *Sustained support.* Interventional programs work better if sustained over time in a supportive environment (i.e. support networks, follow-up contact, booster interventions, farmer empowerment). The potential for promotional activities to build upon existing programs with sustained support should be considered (i.e. take place during times of heightened farm health and safety activity and have the support of key stakeholder groups). Interventions are more successful if programs can be delivered in a receptive environment and having rural community involvement in their design.
7. *Novel farm health and safety interventional approaches and leadership.* Many approaches target the farmer or farm manager and attempt to influence through the farmer as the key decision maker in the farming operation. There is a whole chain of people involved in agriculture who may be used to influence agricultural health and safety (i.e. financial and insurance groups, commodity groups, commodity purchasers, contractors, and farm workers and their families). Alternative targets for intervention also need to be considered.

*Pilot testing interventions in the New Zealand agricultural context.* Any future interventions targeting the agricultural industry in New Zealand need to be piloted and evaluated for effectiveness in reducing agricultural injury and disease in the New Zealand agricultural context (for NZ farmers and on NZ farms), before being implemented nationally.

## **Background, aims and objectives**

### ***Background***

Agriculture is an important part of the New Zealand economy, contributing over 60% of our export earnings and employing 9% of the total New Zealand workforce. Ill health, including injury, in the agricultural workplace is a serious public health problem.

Agricultural occupations are high risk and contribute disproportionately to ACC claims and associated costs. Additionally risks to all who live or visit a farm (families and visitors) are significant. [2] Consequently, it is important to investigate the size and nature of the problem, the hazards and risks that this population are exposed to, and options for prevention of occupational ill health and injury. It is also crucial to make sure that:

- Interventions that are introduced are effective within this group, and
- the critical factors relating to successful interventions, along with any barriers to their implementation, are taken into account in designing and implementing interventions.

So, this project sought to update the knowledge base on injury and disease in this sector and to provide a platform from which stakeholders could work toward developing evidence-based policy and practice aimed at reducing injury and disease in this sector.

### ***Objectives of the survey:***

For farmers, farm workers, and family members living on a farm, to describe the following in relation to the farm on which they live and / or work:

- their current health and injury experiences;
- their exposure to chemical, physical, biological and psycho-social agents;
- their work practices;
- farm occupational health and safety knowledge and practice;
- interventions in place, and
- barriers and critical factors relating to the implementation of interventions.

## Previous work

The work to address this aim was built on our previous work, which has:

- highlighted the major injury problems in this population,
- identified proximal causes, and
- investigated aspects of the prevention of occupational disease and injury in this population group.

This work included:

Survey of the health of New Zealand farmers. In 1980, a national survey was funded by the Department of Health “to identify ... health risks to which [those who work on farms] are exposed”. A stratified random sample of around 3,000 sheep, beef, dairy and horticultural farmers was selected, and a response rate of 75% was achieved. This provided information on: farm characteristics, work organisation, health problems / complaints / illnesses and their perceived causes, allergies, access to health services and first aid, chemical exposure and use of personal protective equipment (PPEs), experience of burns and use of PPEs, eye injuries and infections, hearing loss / aids / PPEs, seating comfort (on machines) and vibration exposure, back injuries and pain, injuries relating to electricity, machinery and plant, animals, alcohol consumption and smoking. [3]

Severe injuries to farmers and farm workers in New Zealand. In this publication, the author reviewed efforts to prevent tractor roll-over injury, before carrying out an analysis of ACC “severe injury” data – by age, sex, occupation, diagnosis, age, activity, cause, and contact. “Severe injury” was operationally defined as claims to the ACC for which earnings-related compensation was paid for more than 30 days, or lump sum payments made for permanent disability. He identified some high risk groups – namely: general livestock farmers, shearers, and female stable hands. Non-fatal injuries, for the former group, were associated with stock handling, farm motorbikes, ATVs, other machinery, and general lifting and carrying tasks. [4]

Farm Injury Prevention Study. Work was funded in the 1990s by ACC to provide a description of injury on farms, and to identify methods of prevention. The most significant problems found, which resulted in serious injury, were those involving

agricultural machinery (predominantly tractors), crashes involving motorcycles (including ATVs), falls from horses, and other falls. [2] The work resulted in a comprehensive report to the ACC, as well as papers that focussed on the nature and prevention of injury associated with tractors [5] and motorcycles / ATVs [6].

Southland farmers study. This was a cross-sectional survey of a random sample of farmers in Southland to describe their exposures and health experience. This work found that farmers experience a high level of injury, low back pain, and noise induced hearing loss. [7] Eighty seven percent (87%) reported using chemicals, with glyphosphates and detergents being the most commonly used. One fifth of users reported one or more acute illnesses associated with chemical exposure, over half being neurological or respiratory in nature. Use of personal protective equipment (PPE) was low. [8]

Farm Workers' Injury Study: This project sought to develop and pilot a method for monitoring farm-related exposure and injury. It aimed to assess the feasibility, validity and acceptability of the methods and their ability to provide robust data. The work identified acceptable methods for capturing these data from farmers and farm workers. Methods included an initial postal survey, followed by six months follow-up using telephone interviewing to obtain information on work activities and injury, an on-site assessment of safety aspects of the farm environment, and concluded with a final postal survey. Improvements in study material design were identified. One of the findings of this work was a recommendation that further similar types of research employ telephone interview methods. [9]

Farm Injury Risk Among Men (FIRM). This Australian-based prospective case-control study, among adult males aged 16 years and older (IPRU were collaborating), aimed to obtain a better understanding of the major risk factors for farm injuries among workers, and to obtain estimates of hazard exposure. Cases were recruited from hospital Emergency Departments. Telephone recruitment and interviewing was used for controls. [10] It provided the current project team with background information that contributed to the development of this survey.

Farmsafe™ evaluation. The FarmSafe™ (FS) Programmes were developed and implemented by the ACC, Federated Farmers of New Zealand (FFNZ), and the FS Consortium. It includes three programmes: “Awareness”, “Plans” and “Skills”. The aims of the IPRU programme of work were to complete a process and impact evaluation of the FarmSafe™ “Awareness” Programme in respect of its effectiveness in improving the attitude to farm safety and the behaviour regarding safe practice and environmental workplace hazards on the farm; as well as an outcome evaluation of the Awareness and Plans programmes. The process evaluation has been completed. [11] For the impact evaluation, a baseline survey of over 750 sheep/beef and/or dairy farmers and farm workers was completed which included measures of safety culture and safety practices on the farm prior to any attendance at a FS “Awareness” workshop. [12] The outcome evaluation has also been completed and the report submitted to the ACC [13]

Work-related determinants of health, safety and well-being of New Zealanders: The main aim of this study was the development of a questionnaire for use in national surveillance of determinants of occupational ill-health. [14] This work was used when developing the survey instrument for the current study.

Other recent work has included identifying key mechanisms of injury to sheep, beef and dairy farmers, and these include ATV use, struck by an animal, doing repetitive work, stock handling (shearing etc), lifting, and slips, trips and falls. [15-17] Earlier work by the Injury Prevention Research Unit (IPRU) also identified falls from horses and machinery-related (particularly tractor) injuries as significant causes of serious injury. [2]

The key exposures of farmers that cause “gradual process” injuries are whole body vibration, noise, and manual handling (including repetition). [7,18-23] Disease agents include respiratory exposures (organic dusts) and chemical exposures. [8,24,25] These and other exposures (e.g. fatigue) play a key part in this work.



### ***Ethics /Privacy***

The IPRU obtained Research Ethics Approval from the Multi Region Ethics Committee for this research. This work was also approved by the ACC's Research Ethics Committee.

## Methods

### *Approach across all phases*

The overall project aims were:

1. To identify key<sup>f</sup> hazards and risks to people working in agriculture and their families.
2. To identify evidence-based effective interventions to address these hazards and risks.
3. To identify the barriers to implementation and adoption of these interventions.
4. To identify the critical factors that should be considered when designing and implementing those interventions.

Below is a table showing these project objectives relating to the overall aim, as well as the main approaches that were used to address the four objectives:

	Aims	Approach
1	To identify key hazards and risks to people working in agriculture and their families.	<ol style="list-style-type: none"> <li>1. Literature review</li> <li>2. Survey of farmers, farm workers and their families to describe exposure to hazards and risks (including both the social and physical environment)</li> <li>3. In depth interviewing of selected farmers, farm workers and their families.</li> <li>4. Interviews of stakeholders</li> </ol>
2	To identify evidence-based effective interventions to address these hazards and risks.	<ol style="list-style-type: none"> <li>1. Literature review</li> <li>2. Interviews of stakeholder</li> </ol>
3	To identify the barriers to implementation and adoption of these interventions.	<ol style="list-style-type: none"> <li>1. Survey of farmers, farm workers and their families.</li> <li>2. In depth interviewing of selected farmers, farm workers and their families to identify barriers to implementation of known effective interventions.</li> <li>3. Interviews of stakeholders</li> </ol>
4	To identify the critical factors that should be considered when designing and implementing those interventions.	<ol style="list-style-type: none"> <li>1. In- depth interviewing of selected farmers, farm workers and their families.</li> <li>2. Interviews of stakeholders</li> <li>3. Synthesis of the information generated by the methods used to address objectives (1) to (3).</li> </ol>

This led to several distinct study phases, listed as follows:

<sup>f</sup> Key agriculturally related hazards and risks are those that (a) are associated with disease or injury outcomes; and (b) are prevalent in the population or in a subpopulation

1. An update of recent literature reviews.
2. A survey of the population to describe: exposure to hazards and risks, interventions already in place, potential problems (barriers and critical factors) relating to implementation of further interventions.
3. Face-to-face interviewing of selected farmers, farm workers and their families to provide a more in-depth look at the same factors.
4. Interviews of other stakeholders to get their perceptions of these.

Each of these study phases has resulted in a report and will result in further published outputs. We have also produced a summary report that makes a number of recommendations that are based on an assessment of the research findings of each distinct phase. Key amongst these is the recommendation for the most effective route for future interventions in this sector and the identification of critical factors that need to be considered when designing and implementing those interventions. The five reports produced as a result of this work are:

- *Effective Occupational Health Interventions in Agriculture. Risks factors for Occupational Injury and Disease in Agriculture in North America, Europe and Australasia: A Review of the Literature (Report No.1)*<sup>g</sup>
- *Effective Occupational Health Interventions in Agriculture. An international literature review of primary interventions designed to reduce injury and disease in agriculture (Report No.2)*<sup>h</sup>
- *Effective Occupational Health Interventions in Agriculture. A report of a survey of risk factors and exposures on farms (Report No.3)*<sup>i</sup> – this current report

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<sup>g</sup> Effective Occupational Health Interventions in Agriculture. Risk factors for occupational injury and disease in agriculture in North America, Europe and Australasia; A Review of the Literature (Report No.1).

Kirsten Lovelock, Rebecca Lilley, David McBride, Stephan Milosavljevic, Heather Yates and Colin Cryer on behalf of the Occupational Health In Agriculture research team.

<sup>h</sup> *Effective Occupational Health Interventions in Agriculture. An international literature review of primary interventions designed to reduce injury and disease in agriculture. (Report No.2).*

Rebecca Lilley, Colin Cryer, David McBride, Kirsten Lovelock, Kate Morgaine, Stephan Milosavljevic and Peter Davidson. Injury Prevention Research Unit, Department of Preventive and Social Medicine, University of Otago.

- *Effective Occupational Health Interventions in Agriculture. Stakeholders, sector dynamics, intra-sector collaborations, and emergent issues of injury and disease prevention in the agricultural sector (Report No.4)*<sup>j</sup>
- *Effective Occupational Health Interventions in Agriculture. Summary report*<sup>k</sup>

The rest of this report focuses on the phase 2 survey of the population which describes problems, exposure to hazards and risks, interventions in place, and barriers and critical factors relating to implementation of other interventions.

## ***Methods description***

### **The target population**

The target population comprised those directly employed in agricultural production, ancillary workers who directly support agricultural production (e.g. farm workers), and the partners and other family members of employers / employees who were potentially exposed to the same work-related hazards and risks on farms.

### **Interview method**

Telephone interviewing was employed. This had been the method of choice in previous work with this population, namely in the Farm Workers Injury Study [9] The variation of exposure over the farming year was addressed by staggering the period of the survey over a 12 month period (see below).

Computer assisted telephone interviewing (CATI) was used. The interviewers sat in front of computer screens whilst they questioned respondents. The interview prompts

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<sup>i</sup> *Effective Occupational Health Interventions in Agriculture. A report of a survey of risk factors and exposures on farms (Report No.3).* Colin Cryer, Kirsten Lovelock, Rebecca Lilley, Peter Davidson, Gabrielle Davie, Ari Samaranayaka, David McBride, Stephan Milosavljevic, Kate Morgaine, Injury Prevention Research Unit, Department of Preventive and Social Medicine, University of Otago.

<sup>j</sup> *Effective Occupational Health Interventions in Agriculture. Stakeholders, sector dynamics, intra-sector collaborations, and emergent issues for injury and disease prevention in the agricultural sector. (Report No.4).* Kirsten Lovelock, on behalf of the Occupational Health in Agriculture Research Team, Injury Prevention Unit, Department of Preventive and Social Medicine, Dunedin School of Medicine, University of Otago.

<sup>k</sup> *Effective Occupational Health Interventions in Agriculture. Summary report. (Report No.5).* Kirsten Lovelock and Colin Cryer, on behalf of the Occupational Health in Agriculture Research Team, Injury Prevention Unit, Department of Preventive and Social Medicine, Dunedin School of Medicine, University of Otago.

were available on the screen, and the responses recorded directly by the interviewer on to the computer, during the interview. This data was captured on a database to which the computer screens linked.

## **AgriBase™ Sample**

We used the database of farms (AgriBase™ - AB), held by AgriQuality™ as the sampling frame. Our previous experience had been that this covers the target population, and that the information held by AB is of acceptable completeness and quality. We used stratified random sampling. Key strata were: (a) Sheep, (b) Beef, (c) Dairy, (d) Horticultural and other crop growing, and (e) Other Livestock. The AB data supply details are shown in Appendix 1.

The target responder for the interview was the person who makes the decisions on the farm (e.g. the farmer, farm manager). This was followed up, where possible, with an interview of either a farm worker (if more than one, selected as the one with the next birthday), or any spouse, partner or family member living on the farm (with the next birthday) aged over 15. The choice of whether to interview a farm worker or family member was made at random.

It was our assessment that a sample size of 500 farms would identify all the common exposures. Statistical study size calculations indicated that this would generate estimates of exposure prevalence with acceptable precision.

The sample was drawn at four separate times during one 12 month period: in July and October 2007, and in January and April 2008. Each sample provided the list for the survey interviews over the subsequent 3 months.

A letter was sent from IPRU in advance of the telephone interviews, to increase the likelihood of a response. The recipient of the letter was given the option to “opt out” of the survey; they were given a toll free number and an email contact address if they chose to do so.

The farm was phoned and the key decision maker was initially approached. They had another chance to opt out when telephoned. If they agreed to the interview, “formal” consent was implied, and the interview proceeded. Following the interview with the decision maker, we then endeavoured to interview one of the other target responders (farm worker or family member) selected at random.

## **ACC sample**

We repeated this survey for a sample of people who had made a recent successful Entitlement Claim to the ACC, for whom their duration of earnings-related compensation was greater than 21 days. This approximates to time off work, or restricted work activities, resulting from injury for over 28 days. We included this second sample in order to describe exposure prevalence in those who have recently made a claim as a result of serious injury. (This second sample also permitted a case-control study investigation to identify risk factors for injury, beyond proximal causes. This is being developed for a separate paper.)

The intention was to use stratified random sampling in the same way as for the AgriBase™ sample, the strata being: (a) Sheep, (b) Beef, (c) Dairy, (d) Horticultural and other crop growing, and (e) Other Livestock. However, there were relatively few serious injuries in any strata except for Dairy, so Dairy was the only stratum sampled randomly; all persons from the other strata with a recent serious injury were included.

The target sample size was again 500 farms, in order to identify a range of exposures and to give precision to the estimates of exposure prevalence.

The sample was drawn at four separate times during one 12 month period: in July and October 2007, and in January and April 2008. The July 2007 sample was of injury events in the period 1 March 2007 to 31 May 2007. Since we wanted to sample people off work or with restricted activities for over 28 days following the injury event, we needed to allow 29 days to elapse following the last day of the target period, before we drew the sample. Similarly,

- the October sample was of injuries that occurred in the period June to August,

- the January sample was of injuries that occurred in the period September to November,
- the April sample was of injuries that occurred in the period December to February.

Each sample provided the list for the survey interviews over the subsequent 3 months.

A letter was sent from ACC and IPRU in advance of the telephone interviews to increase the likelihood of a response. The farm was phoned and the recently seriously injured person was approached. The potential interviewee was given the option to “opt out” of the survey in the same way as for the AB sample. If they agreed to the interview, “formal” consent was implied and the interview proceeded.

The specification for the ACC data, from which we drew the sample, is shown in Appendix 2.

## **Survey questionnaire**

A comprehensive questionnaire was developed to identify injury and disease morbidity, and capture information on a range of potential injury- and disease-related risk factors, including work place factors/hazards associated with increased risk of farm-related injury / disease, safety climate, work status, safety practice, training, and psychosocial factors that might contribute to occupational safety and health, as well as barriers.

We strove to use validated questions, or questions that had been used in previous surveys. The questionnaires used in recent past work that formed the basis of the survey questionnaire included the

- “Farm Workers’ Injury Study”, [9]
- “Process and Impact Evaluation of the FarmSafe™ Awareness Programme”, [11-12]
- “Farm Injury Risk Among Men (FIRM)”, [10]
- The Houghton and Wilson farm survey published in 1994 [26], as well as
- “The Work-related Determinants of Health, Safety and Well-being of New Zealanders”. [14]

These studies were described in the Background. They are a rich source for the identification of validated questions and scales for the questionnaire. All the above instruments were rationalised into the survey questionnaire. The questionnaire took around 60 minutes to administer to the decision maker. The shortest interview was in the order of 30 minutes.

The questionnaire was tested on a small sample of the target population before use in the full survey. The following were assessed in the test:

- time taken / respondent fatigue,
- difficult or misunderstood questions,
- completeness of answer categories,
- repetition,
- relevance, and
- question order.

As a result of this testing, the questionnaire was revised. The final questionnaire is reproduced in Appendix 3.

## **Data Management**

The CATI screens were linked to a database that was automatically populated as the interviewers recorded the responses directly on to their computers.

The data captured was structured with multiple rows of data per person:

- the first row was for all non-repeating questions and the first iteration of repeating questions, and
- the remaining rows were for subsequent iterations of repeating questions. (Repeating questions have the following example form: "for each of your workers in turn can you ...". This question can be answered any number of times by the same person, e.g. in this case, as many times as there were workers on the farm.)

Responses for repeating questions were extracted into separate datasets and removed from the main dataset so only one row of non-repeating responses per person remained in the main dataset. The main dataset was used for most of the analysis (see below),



although for some analyses (relating to all workers or children on the farm), these subsidiary data sets were incorporated.

Up to two people could be interviewed for any property, usually one decision maker and either a family member or worker, if available. The decision maker's interview responses, and the other interviewee responses from the same farm as the decision maker, were linked.

Missing value codes of -1 and -2 were used. These take the following meanings:

- “-1” = response refused;
- “-2” = question was not asked.

The “0” response had different meanings, for each question.

- For responses asking for counts (eg. number of tractors on the farm), “0” meant 0 counts.
- In questions where there could be multiple responses (eg. Q4: “Which of the following features does the farm have?”), 0 means the question was asked but the option was not ticked;
- “0” = missing value code for the remaining questions.

## Statistical Analysis

The statistical analysis was primarily descriptive in nature. Statistics (proportions, means, medians, etc.) were generated for each discrete question. Additionally, the group of questions relating to Safety Climate [27] were modified and combined into four subscales and an overall score. For each component, and the overall score, descriptive statistics were produced: mean, standard deviation, median, 25<sup>th</sup> and 75<sup>th</sup> percentile, minimum and maximum values.

Work safety climate scores for the 4 dimensions were constructed from the following subparts to question 171 (see Appendix 3):

**Table 1: Items that contributed to the construction of the 4 dimensions of the Work Safety Climate scores.**

<b>Dimension</b>	<b>Items</b>
Personal motivation for safe behaviour	1, 2, 3, 4, 6, 7, 8
Risk Justification	9, 10, 11, 12
Positive Safety Practice	13, 14, 15, 16, 17, 18
Controllability (Fatalism)	19, 20, 21, 22, 23, 24

Individual items were added to give a total score, a high score indicating a tendency towards a positive attitude to, or perception of, safety. Respondents were excluded from this analysis if there were 3 or more responses missing from any one subscale. If there were one or two responses missing, they were replaced by the mean of the pertinent subscale's responses. An overall safety climate score was constructed by summing each of the component scores, for respondents for whom all component scores were present.

The responders from the AB sample were categorized as the primary decision maker, farm worker and family member (this information being captured in the variable "role"). For each question, and the Safety Climate scales, cross-tabulations with role were produced and summarised on a single spreadsheet.

The focus of the ACC sample was on people who had recently had a serious injury that resulted in earnings-related compensation of over 21 days. Frequencies for each question, and the Safety Climate scales, were also produced and summarised in a single spreadsheet.

The results for both samples were tabulated and are presented by theme in the Results section. For selected questions, odds ratios (ORs) and 95% confidence intervals (CIs) were computed. On the whole, however, statistical comparisons between the responses from the AB sample and the ACC sample were largely reserved for the case-control analysis – in preparation.

## **Results**

### ***Response***

#### **AgriBase™ Sample**

When attempting to make contact with farmers for interview, 50 telephone numbers were “unobtainable”. For a further 49, there was no answer. For a further 150, the number was answered, but there was no suitable participant / or the target was unknown or deceased. For 657, there was a legitimate interviewee; however, 405 failed to be interviewed – most declined. A small number were not interviewed due to the interview starting but then being discontinued, or the line was cut off, or the interview was rescheduled but never took place. 253 decision makers were interviewed giving a response rate of 38% (253/657).

The sample was chosen to have equal numbers of farms whose main industrial activities were as follows: (a) Sheep, (b) Beef, (c) Dairy, (d) Horticultural and other crop growing, and (e) Other Livestock – via stratified random sampling. This was aimed at ensuring coverage across the main agricultural activities in New Zealand. The reported main source of income of the responders, however, were sheep meat (n=105, 42%), beef (n=94, 37%), wool (n=67, 26%) and dairy (n=53, 21%). (It should be noted that the responders could report more than one main source.) There were relatively few who identified horticultural activities as their main source. This can be regarded, therefore, as predominantly a sample of sheep, beef and dairy farmers.

Only the number of responses from the main decision maker on the farm was sufficient to permit a statistical description of the responses. The remainder of the description of the results from the AB sample will be limited to the main decision maker (referred to as AB-sr below).

## **ACC sample**

When attempting to make contact with injured farmers / workers / family members for interview, 49 telephone numbers were “unobtainable”. For a further 79, the number could not be contacted. For a further 127, the number was answered, but there was no suitable participant / or the target was unknown. For 654, there was a legitimate interviewee; however, 396 failed to be interviewed. Most of these declined, though a small number were not interviewed due to the interview starting then being discontinued, or the line was cut off, or the interview was rescheduled but never took place. 258 were interviewed giving a response rate of 39% (258/654).

Our goal was to use stratified random sampling to select the ACC sample – using the same strata as for the AB sample. However, as explained in the Methods, this was not possible – with less than the target (for the sample) number of serious disabling injuries occurring in any of the strata except Dairy. All eligible ACC claims from the following strata were chosen: (a) Sheep, (b) Beef, (d) Horticultural and other crop growing, and (e) Other Livestock. A random sample of eligible ACC claims related to dairying were selected to reach the target sample number. Despite this greater number of dairy cases selected into the sample, the pattern of response resulted in the following. Of the sample of 258, 50 reported that their main source of income was Wool (19%), 75 indicated sheep meat (29%), 81 indicated beef (31%) and 56 indicated dairy (22%).

## ***Respondent characteristics***

### **AgriBase™ Responders**

These responses indicated that the main decision maker had the following characteristics:

- 68% were farm owners, 19% owner operators, 6% farm managers, 6% sharemilkers (n=253).
- 65% were between the ages of 45 and 64 years, 21% under 45, with 0.5% aged 15-24, and 14% aged 65 and over (n=243)
- The responders were predominantly New Zealand European (90%), with 2% Maori.
- 73% had over 20 years in farming, 20% had 10-20 years, and 7% <10 years (n=243)
- 34% of the responders had more than one job (n=183)
- The majority of responders self-reported high working capacity (n=243).

In brackets are shown the total number of responders to the relevant question.

### **ACC Responders**

The sample of serious injured people who responded (ACC-sr) indicated that they had the following characteristics:

- 34% were farm owners, 15% owner operators, 10% farm managers, 2% sharemilkers, 33% farm workers, 5% family members (n=258).
- 52% were between the ages of 45 and 64 years, 39% under 45, with 6% aged 15-24, and 9% aged 65 and over (n=243); on average, a younger group than the AB-sr.
- The ACC-sr were predominantly New Zealand European (80%), with 8% Maori; ie. fewer NZ Europeans, and a greater proportion declaring themselves Maori, than the AB-sr.
- 51% had over 20 years in farming, 25% had 10-20 years, and 25% <10 years (n=248), substantially less experienced than the AB-sr.
- 12% of the responders had more than one job (n=246); substantially less than the AB-sr.

- The majority of responders had high working capacity (n=246); however, the proportion with low working capacity was greater than for the AB-sr. This is not surprising, given the ACC responders had all experienced a serious injury, resulting in time off work or reduced working, in the previous 6 months.

## *Farm Characteristics*

### **AgriBase™ Sample**

The AB-sr indicated that their farms had the following characteristics:

- The size of their farm: 36% was 0-99ha, 48% was 100-499ha, 14% was >499ha, 2% lifestyle block (n=249)
- The predominant terrain was reported to be: 36% plains, 36% rolling, 12% hill, 1% high country and 14% a combination (n=249)
- The reported features on the farm are shown in Table 2; (overleaf) the majority of farms in the sample had dams/ponds, wool shed, workshop, chemical storage area, rivers/streams, hayshed, implement shed, garage/vehicle storage area, and stockyards.
- The distribution of the number of adults normally resident was: 8% with 0 adult residents, 6% with 1 adult, 46% with 2, 13% with 3, 15% with 4, and 12% with >4 adults (n=252)
- Children under 5: 88% with 0 children, 6% - 1, 4% - 2, 2% - >2.(n=252)
- Children aged 5-12: 79% with 0, 8% - 1, 8% - 2, 4% - >2 (n=252).
- Children aged 13-16: 82% with 0, 9% - 1, 8% - 2, 0.5% - >2 (n=252).
- 56% reported employment of New Zealand-based workers on the farm (n=247).
- 7% reported employment of workers from overseas on the farm. (n=247)
- The main source of income was sheep meat (42%), beef (37%), wool (26%) and dairy (21%); (n=248). (It should be noted that the responders could report more than one main source.)

## ACC Sample

The ACC sample respondents' (ACC-sr) farms had the following characteristics:

- The size of their farm: 31% was 0-99ha, 45% was 100-499ha, 24% was >499ha, 0.5% lifestyle block (n=204). They were, on average, slightly larger farms than reported by AB-sr.
- The predominant terrain was: 35% plains, 33% rolling, 18% hill, 2% high country and 12% a combination (n=249); slightly more hill and high country farms than the AB-sr.
- The features on the farm are shown in Table 2 (overleaf). The majority of farms in the sample had dams/ponds, wool shed, workshop, chemical storage area, rivers/streams, hayshed, implement shed, garage/vehicle storage area, and stockyards. These features are similar to those reported by the AB-sr.
- The distribution of the number of adults normally resident was: 21% with 0 adults, 21% with 1, 28% with 2, 11% with 3, 7% with 4, and 12% with >4 adults (n=252). This distribution is different to that reported by the AB-sr.
- Children under 5: 88% with 0 children, 5% - 1, 3% - 2, 3% - >2 (n=257); almost identical to that reported by AB-sr.
- Children aged 5-12: 81% with 0, 10% - 1, 6% - 2, 4% - >2 (n=257); again almost identical to that reported by AB-sr.
- Children aged 13-16: 86% with 0, 9% - 1, 5% - 2, 0% - >2 (n=257); slightly more farms with no teenage children than reported by AB-sr.
- For 55% there was employment of New Zealand-based workers on the farm; similar to AB-sr (n=258).
- For 11% there was employment of workers from overseas on the farm (n=258); higher than reported by AB-sr.
- The main source of income was wool (19%), sheep meat (29%), beef (31%) and dairy (22%) (n=203)



**Table 2: Features on the farm**

Q4 – features on the farm	AB-sr			ACC-sr		
	Yes	No	%	Yes	No	%
1 Dams/ponds	127	120	51.4	110	95	53.7
2 Wells	86	161	34.8	71	134	34.6
3 Wool sheds	141	106	57.1	123	82	60.0
4 Workshop	215	32	87.0	183	22	89.3
5 Chemical storage area	203	44	82.2	166	39	81.0
6 Stables	33	214	13.4	31	174	15.1
7 Rivers / streams	181	66	73.3	156	49	76.1
8 Haysheds	204	43	82.6	166	39	81.0
9 Silo	70	177	28.3	79	126	38.5
10 Implement Shed	222	25	89.9	179	26	87.3
11 Garage / Vehicle storage area	223	24	90.3	183	22	89.3
12 Forest plantation / block	102	245	29.4	94	111	45.9
13 High voltage overhead powerlines	107	140	43.3	80	125	39.0
14 Silage pit	56	191	22.7	65	140	31.7
15 Offal pit	111	136	44.9	97	108	47.3
16 Milking shed	64	183	25.9	56	149	27.3
17 Fixed irrigation	64	183	25.9	56	149	27.3
18 Stock yards	207	40	83.8	169	36	82.4
19 Sheep dip	33	214	13.4	34	171	16.6
20 Effluent ponds	43	204	17.4	56	149	27.3
21 Other	15	232	6.1	27	178	13.2

## ***Occupational Disease***

### **1.1.1. Illness and disease in the last 12 months**

Seventy four (74) individuals out of 243 from the AB-sr indicated that they had had an illness or disease in the last 12 months, and 49 out of 246 from ACC-sr. Hepatitis and Jaundice were reported once by the ACC-sr; Leptospirosis and “chronic and acute” chemical poisoning were each reported once by each group of respondents. Other responses are shown in Table 3

**Table 3: Illness and disease in the last 12 months**

	AgriBase™		ACC	
	n=243	%	n=246	
Cancer	5	2.1	8	3.3
High BP	36	14.8	17	6.9
Heart attack / stroke	4	1.6	3	1.2
Diabetes	12	4.9	8	3.3
Gout / arthritis	32	13.2	16	6.5
Bronchitis / Pneumonia	6	2.5	4	1.6
Mental illness / breakdown	2	0.8	4	1.6

The main difference between the AB-sr and ACC-sr were decreased reporting of hypertension and gout/arthritis in the ACC-sr.

### **1.1.2. Conditions in the previous 12 months**

To the question “Have you experienced any of the following conditions over the last twelve months?”, there were totals of 201 AB-sr and 202 ACC-sr. A cough lasting for longer than 3 days was the most common condition reported. This was followed by Noise Induced Hearing Loss (NIHL), with prevalences of 19% and 13%, respectively.

Hay fever and asthma requiring medication were also common: 13%/19% and 7.5/10% for AB-sr and ACC-sr, respectively – see Table 4.

**Table 4: Conditions in the previous 12 months**

	AgriBase™		ACC	
	n=201	%	n=202	%
Chronic bronchitis	4	2.0	1	0.5
Asthma and taking asthma medication	15	7.5	20	9.9
Hay fever	26	12.9	39	19.3
Skin cancer (excl melanoma)	8	4.0	4	2.0
Melanoma	5	2.5	5	2.5
NIHL	38	18.9	27	13.4
Eczema	7	3.5	10	5.0
Cough >3 days	45	22.4	38	18.8
Other	6	3.0	5	2.5
None	78	38.8	83	41.1

### 1.1.3. Musculoskeletal symptoms in the previous 12 months

Due to the heavy nature of farm work, musculoskeletal complaints (MSCs) are common in farmers and farm workers (Table 5). Backache was reported by 64% of AB-sr. Shoulder and neck pain was also common, at 57% for AB-sr. Lower limb pain was less commonly reported (36% for AB-sr).

**Table 5: Musculoskeletal symptoms in the previous 12 months**

	AgriBase™		ACC	
	N=212	%	n=220	%
Shoulders and neck	121	57.1	117	58.5
Upper limbs	64	30.2	79	39.5
Lower limbs	78	36.8	116	58.0
Backache	135	63.7	134	67.0

The ACC sample was chosen since they had recently experienced a serious injury. Injury, in this context, includes musculoskeletal disorders and complaints. The main difference between the AB-sr and the ACC-sr was the increased reporting of lower limb problems amongst the ACC-sr, with almost twice the odds of a person in the AB sample reporting such problems (OR=1.93. 95% CI 1.27-2.94).

#### 1.1.4. ACC claims for illness / disease

Amongst AB-sr, 191 responses (either “yes” or “no”) were made to the question “was a claim made to ACC as a result of any of these illnesses/diseases”.

**Table 6: ACC claims for illness / disease**

ACC claims – nature of complaint	AgriBase™		ACC	
	n=191	%	n=208	
Shoulders and neck	31	16.2	36	17.3
Upper limbs	14	7.3	24	11.5
Lower limbs	15	7.9	59	28.4
Backache	38	19.9	51	24.5
No claim made	104	54.5	62	29.8

A small proportion of illness/disease (including MSCs) resulted in a claim being made (Table 6). The lower limb claim prevalence amongst the ACC-sr was 4 times that amongst the AB-sr, (Prevalence OR 4.3, 95% CI 2.2-8.2), and the upper limb claim prevalence was also increased, but not significantly so (OR 1.5, 95% CI 0.8-2.7). Bearing in mind that the ACC-sr had had a serious recent injury, this result may simply reflect the site of that serious injury.

## *Injury in the last 3 months*

### **AgriBase™ Responders**

In this report, injuries are operationally defined as those that resulted in restricted activity for half a day or more, or required advice or treatment by a health professional. They include both injury as a result of a sudden event and also musculoskeletal injury resulting from more chronic exposures.

Thirteen percent (31/243) reported experiencing at least one injury in the previous 3 months, all of which were work-related. The nature and body sites of these injuries are shown in Table 7

**Table 7: Nature of injury experienced in the previous 3 months – AgriBase™ sample.**

	Multiple sites	Head	Neck	Shoulder / upper arm	Wrist, hand	Thigh	Knee, lower leg	Ankle, foot	Upper back / spine	Lower back / spine	Chest	Total
Cut	2	2			2							6
Sprain / strain			1				1	1	1	7		11
Dislocation										1		1
Crush	1			1	1			1			1	5
Amputation												0
Fracture								2				2
Burn						1						1
Bruise	3						2					5
Puncture												0
Poisoning	1											1
Loss of consciousness		2										2

There were a variety of injuries in the 3 months prior to interview, affecting a variety of body sites. The most frequent were:

- sprains and strains, predominantly to the back,
- cuts to the head, wrist/hand, or to multiple body sites,
- crush injuries to either the chest, ankle/foot, wrist/hand, shoulder/upper arm, or to multiple sites, and
- bruising to the lower leg or to multiple sites.

In response to the question, “Was it an internal injury”, 13 responders indicated that it was.

Amongst the responders, the summer had the highest crude (crude rate = 40 per 100), with spring the next highest (crude rate = 13 per 100).

The most likely time of the injury event was:

- later in the morning (10-11am: 33%, 11-12 noon: 13%) or
- later in the afternoon (3-4pm: 7%; 4-5pm: 13%).

All but one of the remaining events took place between 7:00-10:00am, 12:00-3:00pm, and 5:00-6:00pm.

The majority of injury events took place outdoors (73%), with the remainder in a variety of indoor areas. No responder indicated that the event took place in the workshop, packing shed, or equipment shed. For the 22 events that took place outdoor, 73% were on flat terrain, and the majority whilst it was fine and dry (91%). So although, there are hazards associated with workshops and sheds (packing and equipment sheds), and also associated with sloping (especially steep) terrain and wet conditions, these conditions were associated with a minority of events.

Of those that specified an activity, 33% were stock-related, 13% driving/riding, 13% lifting/lowering or loading/unloading, and 10% walking/running. The respondents indicated that the proximal cause was due to overexertion (23%), being bumped, pushed or bitten (23%), struck or crushed by an object (13%), and due to a fall (7%). The most frequent vehicle, piece of machinery, animal or other agent involved were: sheep (19%), cattle (10%), horse (3%), other animal (13%), 2-wheeled motorcycle (13%), and ATV (13%).

Of the 27 (out of 31) who responded to the question asking whether the injury had resulted in contact with a health professional: 7% consulted a community nurse, 52% a family doctor, 18% an specialist doctor, 15% attended casualty, 7% admitted to hospital, and 22% consulted another health professional. Seven responders declared that they had made an ACC claim. Twenty (67%) indicated that it was over 1 week before they could return to normal farming duties.

At the time of the interview, the majority of respondents who had been injured in the previous 3 months rated their current work capacity as poor. Only a third indicated that they were back to normal

## ACC Responders

The ACC responders comprised people who had had a serious injury in the period 1 March 2007 to 29 February 2008, and who were interviewed 3 to 5 months later.

Table 8 shows the nature and body region of injury of the responders from the ACC sample. The source of this data is the ACC compensated claims file and relates to the injury that resulted in earnings-related compensation for over 21 days. Note that where multiple injuries were listed on the ACC claims record, the one relating to the highest sequence number was used. Inspection had indicated that these represented the most serious injuries in the majority of cases inspected.

Table 8 shows that the majority of the injuries relate to the arms, legs and back. The main types of injury were:

- fractures, mainly of the arms and legs, and
- sprains and strains, mainly relating to the arms, legs and back.

**Table 8: Nature of injury experienced in the previous 3 months –ACC sample from ACC claims data.**

Body Region		Nature of Injury											Total
		Open wound	Fracture	Internal organ injury	Unspecified injury	Other specified injury	Superficial & contusion	Dislocation	Crushing	Amputation	Multiple injuries	Burn	
Head & Neck	Traumatic brain injury	1	1	4	1	0	0	0	0	0	0	0	7
	Neck	0	1	0	0	0	0	0	0	0	0	0	1
	Head and neck, other	0	0	0	0	0	0	0	0	0	0	1	1
Spine & Upper Back	Vertebral column	0	3	0	0	36	0	0	0	0	0	0	39
Torso	Thorax	0	4	0	0	2	3	0	0	0	0	0	9
	Abdomen, lower back & pelvis	0	0	0	0	0	2	0	0	0	0	0	2
	Other trunk	0	0	0	0	0	1	0	0	0	0	0	1
Extremities	Upper extremity	15	32	0	0	27	2	6	1	3	1	0	87
	Other lower extremity	9	29	0	1	20	8	2	0	1	1	3	74
	Hip	1	1	0	0	1	0	1	0	0	0	0	4
Unclassifiable by body region	Multiple body regions	0	0	0	0	0	2	0	0	0	0	0	2
<b>Total</b>		<b>26</b>	<b>71</b>	<b>4</b>	<b>2</b>	<b>86</b>	<b>18</b>	<b>9</b>	<b>1</b>	<b>4</b>	<b>2</b>	<b>4</b>	<b>227</b>

The interview picked up those injuries that had occurred in the previous 3 months (105) – slightly less than half of the serious injuries tabulated above. Reassuringly, the injury sites and types of those picked up in the survey are similar to the Table above –

see Table 8 and Table 9. The majority of the injuries relate to the arms, legs, back or multiple sites. The main types of injury were:

- sprains and strains, mainly relating to the arms, legs and back, and
- fractures, mainly of the arms and legs.

This analysis also identified dislocations of various sites including shoulder / upper arm, knee, and multiple sites, crush injuries affecting many different parts of the body, loss of consciousness, and one case of an amputation of the hand / fingers / thumb.

**Table 9: Nature of injury experienced in the previous 3 months –ACC sample from survey responses.**

	Multiple sites	Eyes	Head	Neck	Shoulder / upper arm	Elbow / lower arm	Wrist, hand	Hip	Thigh	Knee, lower leg	Ankle, foot	Upper back / spine	Lower back / spine	Chest	Abdomen / pelvis	Total
Cut	1					1	5		1							8
Sprain / strain	3		1	2	2		1	1		8			11		2	31
Dislocation	2				3		2			3	1		1			12
Crush	3	1	1				2			1	1		1		2	12
Amputation							1									1
Eye		1														1
Fracture	7				4	3	7		2	4	6	1	3	1	1	39
Burn																0
Bruise	5				1		1						1			8
Puncture	2								1	1	2			1		7
Poisoning																0
Loss of consciousness	1		5		1									1		8

The time of the injury event was more evenly spread over the 24 hours than AB-sr, although the peak hours were still:

- later in the morning (10-11am: 13%, 11-12 noon: 10%) or
- in the afternoon (2-3pm: 13%; 3-4pm: 12%; 4-5pm: 12%).

Similar to the AB-sr, the majority took place outdoors (n=69, 68%), with the remainder in a variety of indoor areas. Few responders indicated that the event took place in the workshop, packing shed, stables or equipment shed. So although, there are hazards associated with workshops, sheds (packing and equipment sheds), and stables, these locations were associated with only a minority of events.

For the 69 events that took place outdoor, 54% were on flat terrain, 46% on sloping, with 12% on a steep slope, and the majority whilst it was fine and dry (80%).



Of those that specified an activity, 28% were stock-related, 27% driving/riding, 11% lifting/lowering or loading/unloading, and 6% walking/running. Although the percentages differ, these are the same most frequent recorded activities, as from AB-sr. The respondents indicated that the proximal cause was due to a fall (21%), transportation-related (16%), overexertion (14%), being bumped, pushed or bitten (14%), and contact with sharp object, tool or machine (10%) – some the same, but some different, to the AB-sr.

The vehicle, piece of machinery, animal or other agent involved was more evenly spread for these serious injuries compared with the AB-sr, and included: sheep (9%), cattle (12%), horse (9%), other animal (5%), 2-wheeled motorcycle (6%), ATV (13%), tractor (11%), trailer/other trailed machinery (11%), other agricultural machinery (10%). Respondents could indicate more than one. Twenty four percent reported that none of the options listed were involved.

Of the 101 (out of 105) who responded to the question asking whether the injury had resulted in contact with a health professional: 0% had consulted a community nurse, 50% a family doctor, 38% a specialist doctor, 42% attended casualty, 35% admitted to hospital, and 20% consulted another health professional. Generally, and unsurprisingly, hospital services tended to be accessed more often for the ACC-sr injuries, than the AB-sr. Almost all:

- responded that they made ACC claims
- responded that they were disabled for more than 4 weeks.

At the time of the interview, almost all rated themselves as incapable of work, or that their current work capacity was poor.

## ***Work environment – Physicochemical hazards***

The most prevalent physical exposure was that from vehicle vibration, with 33% of the AB-sr reporting such exposure (Table 10). The noise question asked about “noise so loud that you had to shout” was not so often reported, 14% amongst AB-sr. This may under-represent the true nature of noise in farming, because the noise exposure is often in excess of the New Zealand 85 dB(A) exposure limit.[8]

**Table 10: Physicochemical exposures**

<b>Exposure (always/often)</b>	<b>AgriBase™</b>			<b>ACC</b>		
	Yes	No	%	Yes	No	%
hand-tool vibrations	28	215	11.5	28	218	11.4
vibration from vehicles	79	164	32.5	105	141	42.7
loud noise	34	209	14.0	48	198	19.5
high temperatures	59	184	24.3	93	153	37.8
low temps	52	191	21.4	75	171	30.5
breathing vapours, fumes, dust	9	234	3.7	29	217	11.8
touching dangerous substances	23	220	9.5	46	200	18.7
“radiation” exposure	10	233	4.1	9	237	3.7
cleaning agents, shampoos, disinfectants	48	195	19.8	62	184	25.2
dust fro metals stone, etc.	27	216	11.1	38	208	15.4
dust from textiles, wood, etc	65	178	26.7	95	151	38.6
fumes from solvents, paints, pesticides, plastics	9	234	3.7	14	232	5.7

Several forms of dust exposure were reported. In the AB-sr, that of biological origin (animals, plants etc) was most frequently reported (27%), followed by mineral dust (11%) and “other” vapours and dusts (4%). The corresponding ACC-sr reported 39%, 15% and 12%, respectively. The odds (risk) of exposure to “biological” dusts was higher in the ACC sample (OR 1.7, 95% CI 1.2-2.6).

Other chemical exposures were not so common; although cleaning agent exposure was commonly reported. Handling hazardous substances was quite high for this occupational sample, with 10% of AB-sr reporting such exposure “often”. Including those who “sometimes” touched (or handled) hazardous substances increased the prevalence to over 50% of respondents.

There were significant differences between the two samples regarding exposure to both vapours and handling substances. Those reporting this amongst the ACC-sr were 3½ times more likely to report breathing airborne hazards (Prevalence OR 3.5, 95% CI

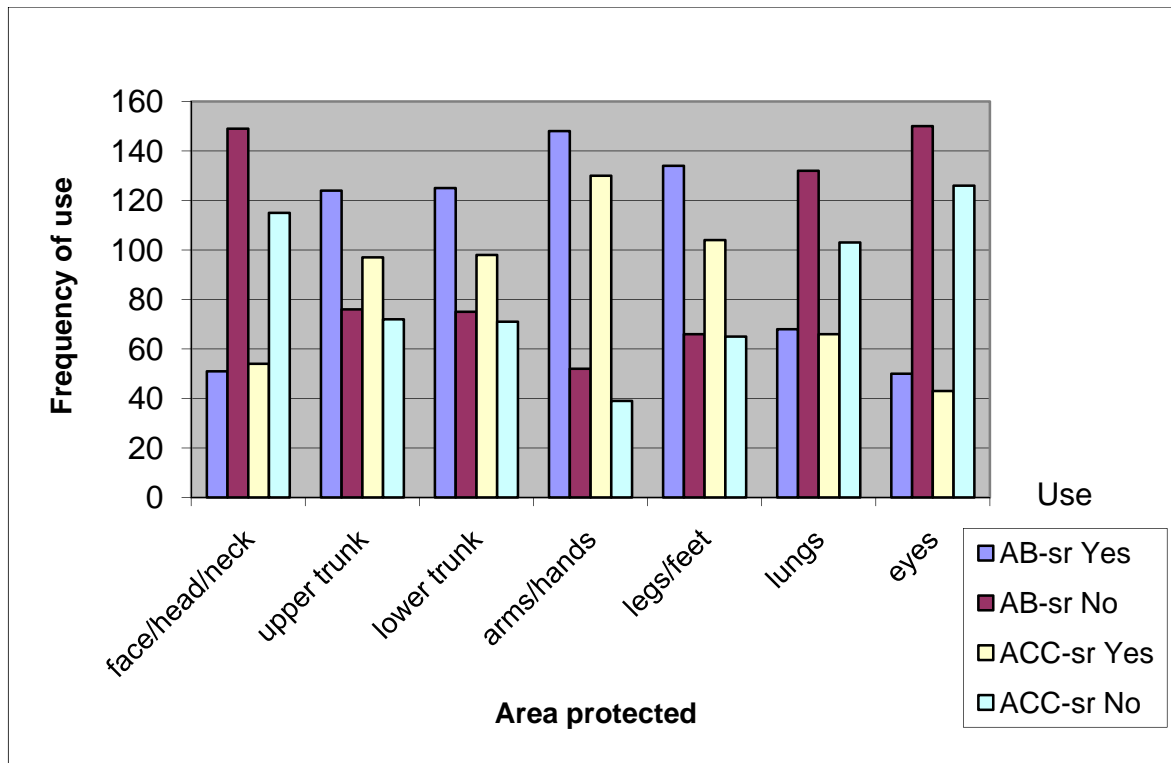
1.5-8.1) and twice as likely to report handling toxic substances (Prevalence OR 1.9, 95% CI 1.2-3.2).

There were tendencies for the ACC-sr to report more physical exposures, with ORs of 1.5 (95% CI 1.1-2.3) for vibration; 1.9 (95% CI 1.3-2.9) for high temperatures, and 1.6 (95% CI 1.1-2.5) for low temperatures. Noisy activities were reported more often for ACC-sr (OR 1.5, 95% CI 0.9-2.5) but not significantly so.

**Table 11: Chemicals used on the farm**

Exposure	AgriBase™			ACC		
	Yes	No	%	Yes	No	%
1. Herbicides	200	39	83.7	173	69	71.5
2. Pesticides	137	102	57.3	117	125	48.3
3. Dips and drenches	184	55	77.0	173	69	71.5
4. Paints	163	76	68.2	118	124	48.8
5. Oil products	211	28	88.3	180	62	74.4
6. Fertilizers	202	37	84.5	185	57	76.4
7. Disinfectants	164	75	68.6	150	92	62.0
8. Detergents	141	98	59.0	133	109	55.0
9. Poisons (for rodents)	195	44	81.6	150	92	62.0
10. Animal health products	191	48	79.9	168	74	69.4
11. Other	6	232	2.5	14	228	5.8

Herbicides were the most commonly used chemicals, with 84% of the AB-sr and 72% of the ACC-sr indicating use; the latter using them significantly less often, OR 0.5, 95% CI 0.3-0.8). They were also significantly less likely to use paints and rodenticides (Table 11).



**Figure 1: Body area protected during chemical use.**

When looking at protection from herbicides, the trunk and extremities were most often protected, with the majority of both samples respondents using such protection (Figure 1). The face, respiratory system and eyes were much less likely to be protected.

The proportion of PPE use against pesticides was similar to those for herbicides.

Table 12 shows the number and percentage of respondents who did not use protective equipment for the specified exposure. Protection against dips, drenches and rodenticides was most often reported, and protection was least often reported for paints and oil products. The pattern of use was similar to that for herbicides, with the exception of the use of hand protection when using rodenticides, for which the reported use in both samples was 56% and 60%, respectively.

**Table 12: Use of protective equipment**

Exposure	AB-sr			ACC		
	Use		% who do not use	Use		% who do not use
	No	Yes		No	Yes	
Dips and drenches	92	91	50.3	86	85	50.3
Paints	121	41	74.7	79	39	66.9
Oil products	154	57	73.0	133	46	74.3
Fertilisers	133	67	66.5	114	68	62.6
Disinfectants	118	46	72.0	96	55	63.6
Detergents	92	49	65.2	84	50	62.7
Rodenticides	96	98	49.5	64	84	43.2
Animal health	122	69	63.9	107	61	63.7
Other	3	2	60.0	8	3	72.7

We asked: “Do you think that your health has been affected by chemicals of any sort that you have used on your farm in the last 12 months?” For AB-sr, 2.5% indicated health effects; for the ACC-sr, 5.3% indicated health effects. Although health effects were reported twice as often in ACC-sr compared with AB-sr, the difference was not statistically significant (OR 2.2, 95% CI 0.8-6.6). Of the 13 individuals who reported a chemical health effect from ACC-sr, 2 reported a respiratory route of exposure, 8 a dermal exposure, and there were 3 “other” routes of exposure. The 6 exposures reported in the AB-sr were 2 respiratory, 3 dermal and 1 other. Eleven out of the 13 with health effects from chemical exposures, in the ACC-sr, affected the farm routine, whereas none of the exposures from the AB-sr did so. Medical treatment was required for most of the exposures reported by the ACC-sr (11 out of 13), but only 2 out of the 6 were reported to require treatment in the AB-sr.

Amongst AB-sr, 61% of respondents stored chemicals in a separate shed, 25% stored them in the main shed, 5% used the garage, and 11% stored them in an “other” area. There were no significant differences between AB-sr and ACC-sr samples, but 1 person in the ACC-sr reported that they kept chemicals in the house (versus 0 in the AB-sr). 86 and 79% of AB-sr and ACC-sr respondents, respectively, locked their chemicals up.

The majority of respondents mixed chemicals: 63% and 57% of the respective samples. Coveralls (67%/62%), boots (77%/76%) and gloves (73%/63%) were worn more often

whilst mixing, but the use of masks, respirators and face protection was low (Table 12).

**Table 13: Use of PPE**

<b>PPE</b>	<b>AgriBase™</b>			<b>ACC</b>		
	<b>Yes</b>	<b>No</b>	<b>%</b>	<b>Yes</b>	<b>No</b>	<b>%</b>
1. Face / dust mask	51	101	33.6	42	96	30.4
2. Respirator	31	121	20.4	32	106	23.2
3. Protective face shield	31	121	20.4	31	107	22.5
4. (C)Overalls	102	50	67.1	85	53	61.6
5. Gloves	111	41	73.0	87	51	63.0
6. Boots	117	35	77.0	105	33	76.1

## Work environment – Ergonomic stressors/factors

Table 14: Work environment – ergonomic stressors / factors.

<u>Ergonomic exposures</u>	<u>AgriBase™ Sample (decision maker)</u>			<u>ACC Sample (serious disabling injury)</u>		
	<u>Yes</u>	<u>(N)</u>	<u>%</u>	<u>Yes</u>	<u>(N)</u>	<u>%</u>
<b>Painful/tiring position</b>	31	243	12.8	72	246	29.3
<b>Heavy loads</b>	56	243	23.0	90	246	36.6
<b>Repetitive hand / arm movts</b>	108	243	44.4	152	246	61.8
<b>Bending without support</b>	62	243	25.5	80	246	32.5
<b>Twisted work posture</b>	33	243	13.6	43	246	17.5
<b>Working with hands raised</b>	31	243	12.8	43	246	17.5
<b>Working in a sitting position</b>	78	243	32.1	80	246	32.5
<b>Exert &gt; walk/stand/normal mvt</b>	92	243	37.9	118	245	48.2
<b>Wear protective equipment</b>	131	243	53.9	150	245	61.2
<b>Mod well informed about risks</b>	235	242	97.1	237	245	96.7

The questions on ergonomic stressors / factors had the following format: “Does your main job involve ...”: “Working in painful or tiring positions”; “Carrying or moving heavy loads”; etc. These ergonomic questions are based on known risk factors for the development of musculoskeletal disorders, and particularly in the rural environment. [28-29]

Consistent with the response of high levels (33%) of exposure from vehicle vibration (see section 0), 32% of both AB-sr and ACC-sr describe working on the farm in a sitting position (Table 14). Other than farm office based activities, the predominant at-risk sitting posture when working on NZ farms is likely to be vehicle based [29] - using quad bikes, tractors and other farm vehicles.

Bending without support (AB-sr 25.5%; ACC-sr 32.5%) and lifting or manoeuvring heavy loads (23.0%/36.6%) in twisted work postures (13.6%/17.5%) that are often

described as painful and tiring (12.8%/29.3%) are consistent with the typical stock work many farmers undertake with sheep, cattle and other farm animals (see further elaboration in the Discussion, section 0).

High levels of repetitive hand/arm movements (44.4%/61.8%) were also reported by these farmers/workers. This is also consistent with stock work (see Discussion, section 0) and upper limb injury. Interestingly, only a small number (12.8%/17.5%) described working with their arms raised and, given the nature of most stock work, this is not surprising as a considerable amount of work will involve stooped and bent forward postures with the arms held below shoulder level.

Despite the considerable majority (97% - both AB-sr and ACC-sr) of farmers describing themselves as being “well” to “moderately well” informed about risk factors for injury, only 54% (AB-sr) and 61% (ACC-sr) reported consistent use of protective equipment.

## ***Work environment – Psychosocial factors***

### **Job stressor prevalence and scores**

#### **Prevalence**

This section examines job stressors in adults working on farms. It is based on responses to a set of questions for which the preamble is as follows:

*“I am now going to read out some events and situations which represent a potential source of farming related stress. Can you please tell me your assessment of the level of stress caused by the event or situation?”*

The questions on farm stressors employed in this study were derived from the top 16 farm stressor scores used in a previous New Zealand study. [30] The response options used in this current survey were “Very stressful”, “Stressful”, “Slightly stressful”, “Not stressful”, and “Not applicable”.



Table 15 shows the proportion of respondents who reported that the listed situations were “Stressful” or “Very stressful”. For both samples, many of the factors were associated with a high prevalence of stressful and very stressful responses.

The results in bold in the following table indicate where the proportions differed significantly between the two samples.

**Table 15: Job stressor prevalence (“very stressful” and “stressful”).**

	AB-sr: Decision maker only		ACC-sr	
	Total N	Stressful/ Very stressful n (%)	Total N	Stressful/ Very stressful n (%)
<b>Finance</b>				
Cash flow	204	70 (34)	179	57 (32)
Farm viability	224	67 (30)	173	51 (30)
Commodity prices	217	58 (27)	172	53 (31)
Debt load	194	64 (33)	151	50 (33)
<b>Time Pressures</b>				
Too much work too little time	224	77 (34)	231	96 (42)
<b>Increased seasonal work load</b>	<b>223</b>	<b>81 (36)</b>	<b>222</b>	<b>115 (52)</b>
Long hours of work	220	51 (23)	227	62 (27)
Few holidays away from farm	205	37 (18)	202	35 (17)
<b>Farm Hazards</b>				
<b>Having a farm related accident</b>	<b>208</b>	<b>97 (47)</b>	<b>233</b>	<b>138 (59)</b>
No help when needed	213	76 (36)	199	72 (36)
<b>Policy &amp; Procedures</b>				
<b>Adjusting to new govt regulations &amp; policies</b>	<b>220</b>	<b>91 (41)</b>	<b>190</b>	<b>55 (29)</b>
Dealing with ACC	194	57 (29)	231	52 (22)
Filling in govt forms	218	80 (37)	203	68 (34)
Complying with HSE Act	244	58 (28)	179	40 (22)
<b>Unpredictable factors</b>				
Machinery breakdown	221	111 (50)	222	103 (46)
Unpredictable weather	227	65 (29)	228	65 (28)
<b>Other factors</b>				
Feeling Isolated	176	11 (6)	186	12 (7)
Bad weather	228	96 (42)	228	90 (40)
Introduction of exotic pests	222	102 (46)	208	85 (41)

Bolded results = Chi square test  $p < 0.05$

For the respondents from the stratified random sample of farms (AB-sr), the top 5 self-reported stressors were “machinery breakdown at busy times”, “introduction of exotic disease that will affect farming”, “having a farm related accident”, “bad weather”, and “adjusting to new government regulations and policies”. These are similar stressors to ACC-sr, but with a different ordering. Stress generated around compliance with policy and procedures were reported as sources of stress more frequently for AB-sr.

Unsurprisingly, farm-related accidents were the predominant source of stress for those farmers and farm workers with a serious injury – for the ACC-sr. After this, the most commonly reported stressors were time pressure or unpredictable farm-related factors. Seasonally related work demands were reported as a source of stress in a high proportion of recently seriously injured farmers and farm workers, more so than for respondents from the random sample of farms (AB-sr).

Comparisons between the two samples indicate those with a recent serious injury were significantly more likely to report increased seasonal work load and having a farm related accident as stressors and less likely to report adjusting to new government regulations and policy as stressors.

### **Stressor scores**

Comparing median scores for each individual stressor in this study revealed little difference in median scores for the majority of stressors measured (

Table 16).

Significant differences in the distribution of stress scores were observed for increased seasonal work load, and having a farm related accident (ACC-sr reported higher stress scores than AB-sr), as well as adjusting to new government policies, and complying with the HSE Act (ACC-sr reported lower stress scores than AB-sr).

**Table 16: Individual stressor scores by sample type (excluding not applicable).**

Stressor	AgriBase™ sample		ACC sample Severe disabling injury		Mann-Whitney U test
	N	Median	N	Median	
Debt load	209	2	168	2	1.11 (p=0.27)
Farm viability worries	243	2	192	2	-0.59 (p=0.56)
<b>Increased seasonal workload</b>	<b>246</b>	<b>2</b>	<b>245</b>	<b>3</b>	<b>3.43 (p=0.001)</b>
Dealing with ACC	212	2	249	1	-0.89 (p=0.38)
Bad weather	251	2	251	2	-0.39 (p=0.70)
<b>Complying HSE Act</b>	<b>222</b>	<b>2</b>	<b>201</b>	<b>2</b>	<b>-2.05 (p=0.04)</b>
Filling government forms	236	2	224	2	-1.33 (p=0.18)
Time & work pressures	245	2	254	2	1.55 (p=0.12)
Commodity price worry	237	2	193	2	0.16 (p=0.87)
<b>Policy &amp; regulation adjustment</b>	<b>238</b>	<b>2</b>	<b>212</b>	<b>2</b>	<b>-2.34 (p=0.02)</b>
Unpredictable weather	250	2	251	2	-0.33 (p=0.74)
Machinery breakdown	241	2	244	2	0.13 (p=0.90)
Long hours of work	244	2	250	2	-0.30 (p=0.76)
Few holidays	224	1	223	1	-1.29 (p=0.20)
<b>Having farm-related accident</b>	<b>228</b>	<b>2</b>	<b>256</b>	<b>3</b>	<b>2.99 (p=0.003)</b>
No farm help	232	2	220	2	0.31 (p=0.76)
Feeling isolated	195	1	205	1	1.23 (p=0.22)
Exotic pest concerns	243	2	231	2	-0.35 (p=0.73)
Cash flow	224	2	198	2	-0.33 (p=0.74)

1=Not stressful; 2= Slightly Stressful, 3=Stressful; 4=Very Stressful.

## Work organisation

Table 17 shows the distribution of working hours by season. The longest working hours for both ACC-sr and AB-sr occurred in Spring and Summer. There appears to be little difference in median working hours for each season between our two groups. As expected, winter working hours were the shortest with a median of 7 hours worked per day, while spring working hours were the longest with a median of 10 hours worked per day. Maximum working hours suggest that for some respondents' work on the farm involves extremely long days with maximum working hours of 15 to 20 hours per day reported across the farming seasons. We are unable to differentiate between time spent working on various farming tasks on the farm property or time spent working on farm administration. However, from the long working hours reported by some respondents, it appears that evening work has been included in their daily total and that this work may include administration activities.

**Table 17: Number of hours worked per day**

Season	AgriBase™ sample				Severe disabling injury ACC sample			
	#	min	Median	max	#	min	median	max
Autumn	244	0	8	20	257	0	8	17
Winter	244	0	7	15	257	0	7	18
Spring	244	0	9.5	20	257	0	10	19
Summer	244	0	9	20	257	0	9	19

Table 18 shows the distribution of days worked per week by season. There is little difference in length of working weeks between both the sample groups; or between the seasons. The median number of working days in a week was 6 days per week, with the exception of a median of 7 days per week for AB-sr in Spring. This survey indicates that farmers are working long working weeks throughout the year, with half taking time off from farm work only one day or less per week.

**Table 18: Number of days worked per week**

Season	AgriBase™ sample				Severe disabling injury ACC sample			
	#	min	median	max	#	min	median	max
Autumn	292	0	6	7	291	0	6	7
Winter	292	0	6	7	291	0	6	7
Spring	244	0	7	7	257	0	6	7
Summer	243	0	6	7	258	0	6	7

## Business arrangements

Table 19 shows the characteristics of business arrangements on respondent farms.

A greater proportion of ACC-sr reported farms that were partnership arrangements. Exactly what form the partnership takes is not captured by this survey but it could be expected to include farming couples and family partnerships. Business partnerships would be expected to be captured under the registered company category.

A smaller proportion of ACC-sr reported farms that were registered companies (11% of ACC-sr compared with 19% of AB-sr).

**Table 19: Business arrangement by sample type.**

Business arrangement	AgriBase™		ACC	
	n	%	n	%
Individual ownership	44	17.7	25	12.3
Partnership	95	38.3	100	49.3
Maori incorporation	2	0.8	0	0.0
Registered company	46	18.5	22	10.8
Maori Trust	0	0.0	0	0.0
Family Trust	49	19.8	44	21.7
Other	12	4.8	12	5.9

## Employees

In total there were 292 employees on AB-sr farms, and 318 employees on ACC-sr farms. Table 20 shows the type of employment contracts for farm employees on respondents' farms. The vast majority of both samples were employed on an on-call or casual nature. The next most common employment arrangement was an unlimited permanent contract, followed by fixed term contract. Overall farms were found to use more flexible contract arrangements for employees; only 1 in 4 employees were on permanent contractual arrangements.

ACC-sr farms were more likely to report having employees in their employment on sub-contracts. We are unable to say that these contract types put individual workers at greater risk of injury as we have collected only farm level data on employee contracts. However, this result suggests that farms that are more likely to sub-contract out portions of farm work are associated with poorer health and safety conditions.

**Table 20: Employee contract types.**

Employee contract type	AgriBase™ (N=292)		ACC (N=318)	
	N	%	N	%
Unlimited permanent	68	23.3	80	25.2
Fixed term	59	20.2	61	19.2
Temp employment agency contract	0	0.0	2	0.6
Apprentice or other train scheme	0	0.0	0	0.0
On call / casual	137	46.9	126	39.6
Subcontract	20	6.8	46	14.5
Other	8	2.7	3	0.9
	292	100.0	318	100.0

## Multiple job holding

The characteristics of multiple job holding are presented in Table 21. One in three of the AB-sr held more than one job while only one in eight held more than one job amongst the ACC-sr. Of those who held more than one job, the second job was less likely to be permanent, provide an employment contract, and more likely to be of less than 6 months in duration. These results suggest that those with multiple jobs are engaged in temporary or casual secondary employment, possibly of a seasonal nature.

**Table 21: Table of multiple job holding and the employment characteristics of those jobs.**

	AgriBase™		ACC	
	n	%	n	%
Hold > 1 job	62	33.9	30	12.2
Permanent employment status	17 (N=62)	27.4	9 (N=28)	32.1
Weeks in employment (<6 m)	12 (N=15)	80.0	24 (N=30)	80.0
Employment contract (Yes)	24 (N=62)	38.7	8 (N=29)	27.6
Individual contract	5 (N=24)	20.8	6 (N=8)	75.0
Type of contact – unlimited permanent	12 (N=12)	100	5 (N=8)	62.5



## **Children**

### **Exposures of Children by Age**

This section identifies the types of agricultural activities and tasks children are engaged in on NZ farms. This section describes the variations in involvement by age and gender. The data from both samples have been pooled for the following analyses related to children.

Based on the respondents to this question, over a quarter of farms (28%; 148/385) reported having children living on the farm. Assuming non-response equates to no children, Table 22 describes the distribution of children on farms by age. In total 304 children were reported to be currently living on these farms.

**Table 22: Distribution of children on farms by age grouping.**

<b>Number of children</b>	<b>0 to 4 yrs old</b>	<b>5 to 9 yrs old</b>	<b>10 to 14 yrs old</b>
0	459	447	421
1	22	37	44
2	13	22	30
3+	7	5	16

This section examines the pattern of exposure to farm activities and hazards by age of the child. Table 23 shows the proportion of children who “sometimes” or “always” undertake the selected activities on the farm.

**Table 23: Children participating (sometimes or always) in on-farm activities by age category.**

Activity	Age categories		
	<5 yrs N=46	5-9 yrs N=89	10-15 yrs N=151
<b>Farm machinery &amp; transport – number (%)</b>			
Ride a bicycle	14 (30.4)	79 (88.8)	112 (74.2)
Operate 3 wheel ATV	0	0	4 (2.6)
Operate 4 wheel ATV	0	4 (4.5)	59 (39.1)
Ride ATV as passenger	15 (32.6)	48 (53.9)	91 (60.3)
Operate motorcycle	1 (2.2)	15 (16.9)	65 (43.0)
Ride horses without helmet	1 (2.2)	2 (2.2)	8 (5.3)
Operate tractors	0	0	22 (14.6)
Ride tractor as passenger	10 (21.7)	30 (33.7)	63 (41.7)
Ride trailers	1 (2.2)	32 (36.0)	60 (39.7)
Play near machinery	2 (4.3)	16 (18.0)	29 (19.2)
<b>Farm structures – number (%)</b>			
Access to silo	0	5 (5.6)	27 (17.9)
Swim in dam/pond	0	4 (4.5)	16 (10.6)
Swim in river/stream/lake	6 (13.0)	33 (37.1)	57 (37.7)
Access to hayshed	4 (8.7)	48 (53.9)	104 (68.9)
Access to workshop	4 (8.7)	41 (57.3)	104 (68.9)
<b>Work – number (%)</b>			
Work with stock	9 (19.6)	46 (51.7)	110 (72.8)
Feed animals	17 (37.0)	57 (64.0)	111 (73.5)
Do heavy lifting	0	2 (2.2)	20 (13.2)
Mix agrichemicals	0	0	1 (0.7)
Earmuffs worn near noisy machinery	14 (30.4)	41 (27.2)	90 (59.6)
Wear safety boots on farm	1 (2.2)	21 (13.9)	47 (31.1)
Operate chainsaw	0	0	3 (2.0)
Use firearms	0	5 (5.6)	32 (21.2)
Operate farm workshop machinery	0	1 (1.1)	23 (15.2)
Accompany others while they work on farm	7 (15.2)	69 (45.7)	127 (84.1)

### **Aged <5yrs:**

The most common farm activities undertaken by children aged less than 5 years of age were:

- feeding animals (37%);
- riding an ATV as a passenger (33%);
- riding a bicycle on the farm (30%);
- working with stock (20%); and
- riding on a tractor as a passenger (22%).

While no children aged 0-4 yrs of age were reported to be operating an ATV or tractor, one child was reported to be operating a motorcycle and another riding a horse without a helmet at this age. Allowing children to play near machinery was uncommon with only 2 children reported. In terms of protective behaviours, close to a third reported their young child wearing earmuffs near noisy machinery

Compared to the older groups of children, overall exposure to farm hazards related to work are comparatively low in this vulnerable group of 0-4 year olds. The most common exposures for this group of young children were associated with animals (feeding animals and working with stock) and riding on farm vehicles (ATVs and Tractors) as passengers. It was not common for young children to accompany others onto the farm while they worked on the farm.

Of those farms with 0-4 year olds, 80% reported having a place with a secure fence for children to play within.

### **Aged 5-9yrs:**

The most common activities for children aged 5-9yrs of age that were asked about were:

- riding a bicycle on the farm (89%);
- feeding animals (64%);
- riding ATV's as a passenger (54%);

- working with stock (52%);
- riding trailers (36%); and
- riding tractors as a passenger (34%).

Greater than half of all 5-9 year olds had access to the hayshed (54%) and the farm workshop (57%). No children were reported to be operating tractors, using chainsaws or mixing agrichemicals at this age. A small number of children were using firearms (6%) and operating farm workshop machinery (1%).

While riding farm vehicles was a common activity in 5-9yr olds, operating these vehicles was unusual with no children operating tractors and only 4 operating ATVs. However, operating motorcycles was a more common farm activity in this age group (17%). An increasing proportion of children were also playing near farm machinery (16%) and were accompanying others onto the farm while they work (46%), compared with the youngest groups of workers.

### **Aged 10-15 yrs:**

The most common reported farm activities for children aged 10-15 years of age, of those listed, were:

- working with stock (73%);
- feeding animals (74%);
- riding ATV as passenger (60%);
- operating ATV (42%);
- operating motorcycles (43%)
- riding tractors as passenger (42%); and
- riding trailers as passenger (40%).

By this age the vast majority of children (84%) were accompanying others out onto the farm while work was being undertaken. The most common activities in 10-15 year olds were: working with animals, operating farm vehicles, and riding as passengers on farm vehicles.

Access to hazardous sites on the farm was greater in this age group, compared with the younger age groups, with access to hay sheds (69%) and workshops (69%). With increasing numbers of 10-15 year olds accessing farm workshops, an increasing number of this age are reported to be operating farm workshop machinery (15%) compared with younger children (0% and 1%). Use of personal protective equipment is also higher in this age group with 60% reported to wear ear-muffs near noisy equipment and 31% wearing safety boots. Operating chainsaws (2%) and mixing agrichemicals (1%) were still the least common activities for farm resident children with these activities only undertaken by a handful of children at this age.

## **Gender and farm safety exposures**

Patterns of exposure to farm hazards are evident by gender.

Table 24 shows the proportion of boys and girls of different age groups who “sometimes” or “always” undertake the selected activities on the farm.

Overall more male children operated ATVs, motorcycles and tractors compared with females of all ages. Riding on tractors and ATVs as passengers was also slightly higher in male children age 10-15, although the level of activity was similar for both genders in the 5-9 year old age group. For females a greater proportion were riding horses (without helmets) than males. Males were more likely to be playing near machinery from the age of 5 years onwards and operating farm workshop machinery from the age of 10 years onwards. Relatively similar proportions of males and females were working with stock and feeding animals. Heavy lifting and firearm use was almost exclusively a male farm activity for children, with very few females involved in these work activities. Wearing of protective personal equipment was higher in male children age 10-15. Relatively similar proportions of males and females were accompanying adults onto the farm.

**Table 24: Proportion of children participating (sometimes or always) in on-farm activities, by age and sex.**

Activity	Age Categories						Total	
	< 5 yrs		5-9 yrs		10-15 yrs		M	F
	M (N=25)	F (N=21)	M (N=46)	F (N=43)	M (N=79)	F (N=72)	M (N=150)	F (N=136)
<b>Farm vehicles and machinery</b>								
Ride a bicycle	36.0	23.8	84.8	81.4	79.7	68.1	74.0	65.4
Operate 3 wheel ATV	0	0	0	0	2.5	2.8	1.3	0.4
Operate 4 wheel ATV	0	0	7.0	2.3	41.8	36.1	24.0	19.9
Ride ATV as passenger	36.0	28.6	54.3	53.5	63.3	56.9	56.0	51.5
Operate motorcycle	4.0	0	23.9	9.3	63.3	20.8	41.3	14.0
Ride horses without helmet	0	4.8	2.2	2.3	0	11.1	0.7	7.4
Operate tractors	0	0	0	0	22.8	5.6	13.2	2.9
Ride tractor as passenger	28.0	14.3	32.6	34.9	46.8	36.1	39.3	32.4
Ride trailers	4.0	0	32.6	39.5	39.2	40.3	31.3	33.8
Play near machinery	4.0	4.8	21.7	14.0	25.3	12.5	22.8	11.8
<b>Farm structures</b>								
Access to silo	0	0	4.3	4.7	12.7	18.1	8.0	11.0
Swim in dam/pond	0	0	4.3	4.7	11.4	9.7	7.3	6.6
Swim in river/stream/lake	8.0	19.0	45.7	27.9	45.6	29.2	39.3	27.2
Access to hayshed	4.0	14.3	41.3	67.4	74.7	62.5	52.7	56.6
Access to workshop	12.0	4.8	41.3	51.2	72.2	65.3	52.7	51.5
<b>Work</b>								
Work with stock	19.0	23.8	60.5	46.5	81.9	70.8	59.3	55.9
Feed animals	42.9	38.1	72.1	60.5	83.3	70.8	66.7	62.5
Do heavy lifting	0	0	4.7	0	23.6	4.2	12.7	2.2
Mix agrichemicals	0	0	0	0	2.8	1.4	1.5	0.7
Wear earmuffs near noisy machinery	42.9	23.8	44.2	51.2	75.0	48.6	54.7	45.6
Wear safety boots on farm	4.8	0	23.3	25.6	43.1	22.2	28.0	19.9
Operate chainsaw	0	0	0	0	4.2	0	2.0	0
Use firearms	0	0	11.6	0	38.9	5.6	22.0	2.9
Operate farm workshop machinery	0	0	0	2.3	29.2	2.8	14.0	2.2
Accompany others while they work on farm	47.6	52.4	76.7	83.7	93.1	83.3	73.3	78.7

## Parents suggestions for preventing injuries to children

Parents were asked to suggest ways in which injuries to children can be prevented on farms. Table 25 summarises the responses given.

The most common suggestion for preventing injuries to children was that children should be constantly supervised. There was a general recognition that children needed high levels of supervision on the farm to avoid injuries - many parents suggested the need to have “eyes in the back of their heads”. Many parents also suggested taking what was frequently referred to as a “cotton wool approach”, where children should be banned or restricted from going onto the farm itself. Furthermore, a number of parents suggested specific bans on the use of ATVs, tractors, and machinery, and working with animals. The most commonly suggested specific ban was ATV use.

Education or training for children was also a common suggestion from parents - in order to have children understand the consequences of their actions and/or the dangers of the farm

Respondents also suggested that safety is “common sense”. Exactly whose “common sense” is being referred to (either the parent’s or the child’s) is not discernible from these answers. A handful of parents also suggested that children should take more care on the farm. In this case it appears that parents feel the responsibility for child farm safety rests with the safety behaviours of the child themselves.

**Table 25: Summary of responses regarding the prevention of farm-related injuries to children**

	<b>Number of responses</b>
Parents should be aware and more safety conscious	2
Safety comes down to “good parenting”	4
Safety comes down to “common sense”	16
Children should have proper supervision	35
Have children understand either the consequences of their actions and or the dangers of the farm through proper training	10
Children should have proper equipment and protection	2

Children should have to wear bike helmets	4
Children should use seating and restrains on machinery	1
Less complacency/more care	4
Have barriers between house and farm	1
Give children clear instructions/rules	6
Restrict children's access to farm "cotton wool approach"	18
Restrict children's access to ATVs/motorbikes	12
Restrict children's access to machinery/tractors	4
Restrict children's access to animals	3
Teach children while young	5
Make children aware of farm hazards through education	15
Don't put children in danger in first place	2
Age appropriate motorcycle use	1
Learn from Dad's mistakes	1
They will learn from own experience	1
Accidents will happen regardless	2

### ***Selected workplace exposures – vehicles / machinery / animals***

AB-sr reported high levels of exposure to the following:

- 2 wheeled motorcycles (34%)
- 4-wheeled ATVs (77%)
- Tractors (92%)
  - Implements pulled by tractors (87%)
- Shearing equipment (50%)
- Chainsaws (86%)
- Firearms (69%)
- Workshop equipment (89%)
- Stock (73%).

ACC-sr reported similar proportions, with the following exceptions:

- There was a lower reported exposure to shearing equipment (39%); to tractors (81%); to chainsaws (71%); to firearms (43%); to workshop equipment (75%); and to stock (60%).

The full extent of these reported exposure profiles are shown in Table 26.



**Table 26: Selected exposures to vehicles, machinery and animals**

**Selected exposures – vehicles / machinery / animals**

Q130 – type of machinery used	AB-sr			ACC-sr		
	n	N-n	%	n	N-n	%
1. 2-wheeled farm bike	83	158	34.4	81	164	33.1
2. 3-wheeled ATV	4	237	1.7	3	242	1.2
3. 4-wheeled ATV	185	56	76.8	182	63	74.3
4. Milking equipment	54	187	22.4	61	184	24.9
5. Shearing equipment	120	121	49.8	95	150	38.8
6. Tractor	221	20	91.7	198	47	80.8
7. Implements pulled by tractor	210	31	87.1	186	59	75.9
8. Chainsaw	208	33	86.3	174	71	71.0
9. Harvester	38	203	15.8	35	210	14.3
10. Firearms	167	74	69.3	105	140	42.9
11. Workshop equipment	214	27	88.8	183	62	74.7
12. Farm forestry equipment	54	187	22.4	42	203	17.1
13. Irrigation equipment	63	178	26.1	60	185	24.5
14. Horses	41	200	17.0	47	198	19.2
15. Stock	177	64	73.4	148	97	60.4
16. Other	12	229	5.0	17	228	6.9

## Tractors

The exposure profile reported by AB-sr is that 92% reported at least 1 tractor on the farm, and 40% reported the presence of implements pulled by tractors. For ACC-sr, 81% reported at least 1 tractor on the farm, and 76% to implements pulled by tractors. For farms with tractors, approximately 1/3<sup>rd</sup> had 1, 1/3<sup>rd</sup> had 2, and 1/3<sup>rd</sup> had 3 or more. There were fewer tractors reported on farms by ACC-sr.

## Safety features

Amongst AB-sr responder farms, the percentage of farms where at least one tractor on the farm was missing a safety feature were as follows: roll-over protective structure (11%), enclosed cab (40%), seatbelts (56%), passenger seats (25%), guarded PTOs (9%) and safety starter (14%). Even where seatbelts were available on tractors, they were rarely used. ACC-sr reported that the above safety features were absent for a greater proportion of the farms.

## **Unsafe behaviour**

For the large majority of farms (>90%) in both samples, the respondent reported that they rarely or never carried passengers on tractors without a passenger seat, or got on or off a moving tractor. For the majority of farms, the respondent reported that they always or often parked on level ground. However, a high proportion of responders reported always or often leaving their keys in the ignition when the tractor was unattended. This is a potential problem if children can get access to the tractor.

## **2-wheeled motorcycles**

66% of AB-sr farms did not have a 2-wheeled farm bike; and 67% of ACC-sr farms.

Amongst those AB-sr farms that did, a high proportion indicated that it was used for transport and for mustering. Only a small minority reported it ever being used for towing or spraying, and a bigger minority reported that it was used for recreation and carrying. A similar pattern of usage was apparent for the ACC-sr; however, a smaller proportion of farms used the bike for recreation, and a larger proportion for spraying, carrying and towing.

In both samples, a high proportion carried out regular maintenance. Amongst respondents who used a farm bike, 19% of the AB-sr always used a helmet, and in 11% of the ACC-sr. Two thirds of both sample respondents reported always wearing boots when using the farm bike.

## **All Terrain Vehicles**

79% of AB-sr, and 76% of the ACC-sr reported that there was at least 1 ATV on their farm.

Amongst those AB-sr farms that had an ATV on their farm, a high proportion indicated that it was used for transport (97%), carrying (94%), towing (93%) and for mustering (84%). A minority reported that the ATV(s) were ever used for recreation (35%). A similar pattern of usage was apparent for the ACC-sr; however, a smaller proportion of

farms used the bike for recreation (25%), and a larger proportion for mustering (92%). The ATV tended to be used every day.

Amongst those farms that did use ATVs, only a minority reported that they had no go areas marked on a farm plan: 11% for the AB-sr, and 15% for the ACC-sr. Few indicated that they always use a helmet (3% for the AB-sr, 4% for the ACC-sr). Approximately half of each sample respondents indicated that they always wore work boots when using the ATV, and only 2 people ever wore a seatbelt.

63% of the AB-sr reported sometimes or always carrying passengers, 18% reported that they sometimes or always get on or off a moving ATV, the majority (75%) reported sometimes or always leaving their keys in the ATV when unattended. Similar responses were obtained from the ACC-sr, except that a lower proportion reported that they sometimes or always carried passengers (54%).

## **Chainsaws**

86% of the AB-sr and 71% of the ACC-sr indicated that they had at least one chainsaw on the farm. Amongst the AB-sr, they indicated that they always wore the following when using a chainsaw: eye protection (52%), gloves or chainsaw mittens (32%), chaps (47%), boots (78%), helmets (48%), earmuffs (83%). The corollary is that there are a high proportion of occasions where these safety items were not worn whilst using a chainsaw. The ACC-sr indicated similar percentages, with the exception of the following: a higher percentage reported always wearing eye protection (62%), and a slightly higher proportion reported always wearing helmets (54%).

## **Others**

The proportions of responders who indicated that there were horses on the farm were: 17% for AB-sr, and 19% for ACC-sr. A low percentage of those respondents reported always wearing a helmet whilst riding horses: AB-sr (24%), ACC-sr (38%).

The proportions of responders who indicated that there was stock on the farm were: 73% for AB-sr, and 60% for ACC-sr. Safety features were prevalent on the respondents farms to varying degrees – see Table 27

**Table 27: Farm stock – safety features on farms**

	AB-sr			ACC-sr		
	n	N-n	%	n	N-n	%
a. Escape openings for workers in stockyard	47	128	26.9	49	99	33.1
b. Head crusher for controlling stock	96	79	54.9	72	76	48.6
c. Handrails	37	138	21.1	38	110	25.7

The proportions of responders who indicated that there was at least one dairy shed on the farm were: 21% for AB-sr, and 23% for ACC-sr. Safety features were prevalent on the respondents farms to varying degrees – see Table 28

**Table 28: Dairy shed – safety features on farms**

	AB-sr			ACC-sr		
	n	N-n	%	n	N-n	%
a. Safety guards on all moving parts	41	14	74.5	48	12	80.0
b. Non-slipping flooring	15	40	27.3	27	34	44.3
c. Tripping hazards removed	18	37	32.7	33	28	54.1
d. RCDs on the electrical switchboard	30	25	54.5	39	22	63.9

Almost all of the farms had at least one workshop. In response to the question: “For all workshop equipment, are there safety guards on saws, planes, routers, grinders, augers and cutting blades?”, 79% of AB-sr answered “yes-all”, and 83% of ACC-sr. Additionally, amongst AB-sr, the percentage who reported always using the following PPEs was as follows: earmuffs (47%), safety goggles (49%), heavy duty gloves (13%), boots (69%), and residual current device (RCD) or isolator (67%). The reported percentages were similar for the ACC-sr.

When using electrical equipment outdoors, 82% of the AB-sr reported always using an isolating transformer or RCD (lower for ACC-sr – 69%). 76% reported often or always working alone (similar for ACC-sr – 72%), and 39% reported always carrying a cell phone (higher for ACC-sr – 47%).

## ***Work Safety Climate***

Safety climate describes the workers attitudes to, and perceptions of, workplace safety. Most measures have been developed in workplaces that are medium to large

enterprises, with management hierarchies. Farming in New Zealand is typically a microenterprise with less than 5 employees. The Safety Climate Measure used here has been adapted from Williamson and colleagues' measure to the New Zealand farm-workplace. [27,31]

Table 29 reports the overall Safety Climate Measure score and the four sub-scores which contribute to it. For both the AB-sr and ACC-sr groups' Safety Climate Measure (SCM), the mean scores were just over 60% of the possible total score of 120, which indicates a tendency to a good attitude to, and perception of, safety in the workplace. Nevertheless, the top end of the range for each group stops well short of the possible best score of 120. For the overall SCM and all four sub-scores, the AB-sr had the highest mean scores. (For all scores, the median was close to the mean suggesting that the distribution of scores was relatively symmetrical.)

**Motivation:** Both the AB-sr and the ACC-sr groups' mean scores for the "Motivation" factor were just over half the possible score. This suggests that workers did perceive their workplace as a positive contributor to their capacity to work safely.

**Justification:** Similarly, both the AB-sr and the ACC-sr groups' mean scores for the "Justification" factor were just over half the possible score. Workers were partially inclined to justify their unsafe practice by blaming lack of training, pressure to complete a task, or the right equipment not being available.

**Practice:** In keeping with this, their "Perception of positive safety practice in the workplace" was relatively high. Williamson et.al found that those who had experienced a previous injury reported poorer safety practice in the workplace ("Practice"). [27] While there was a small difference in scores in this study between those who had had a serious injury (ACC-sr) and those who had not (AB-sr), the difference was not statistically significant.

**Control:** Workers who had experienced a severe injury (ACC-sr) had a lower "Control" mean score than the AB-sr, suggesting they perceived themselves to have less control over the safety of the workplace.

**Table 29: Safety Climate.**

	<b>AgriBase™ Sample</b>	<b>ACC (severe injury) sample</b>
<b>Safety Climate Measure (120)</b>		<b>p=0.0024</b>
Mean (SD)	75.53 (7.69)	73.21 (9.62)
95% Confidence Interval	74.60 - 76.46	72.06 - 74.38
Median	76	74
Range	51 – 95	41 – 98
Difference in means	-2.31	95% CI -3.79 – -0.82
<b>Motivation (40)</b>		<b>p=0.1003</b>
Mean (SD)	22.33 (4.37)	21.67 (4.71)
95% Confidence Interval	21.80 - 22.85	21.11 - 22.24
Median	22	22
Range	10 – 33	8 – 34
Difference in means	-0.65	95% CI -1.42 – 0.13
<b>Justification (20)</b>		<b>p=0.6886</b>
Mean (SD)	12.16 (2.47)	12.06 (2.8)
95% Confidence Interval	11.86 - 12.45	11.73 - 12.40
Median	12	12
Range	4 – 18	4 – 19
Difference in means	-0.92	95% CI -0.54 – 0.36
<b>Practice (30)</b>		<b>p=0.0699</b>
Mean (SD)	22.27 (2.57)	21.78 (3.59)
95% Confidence Interval	21.96 - 22.58	21.35 - 22.21
Median	23	23
Range	13 – 28	7 – 30
Difference in means	-0.49	95% CI -1.02 – 0.04
<b>Control (30)</b>		<b>p=0.0001</b>
Mean (SD)	18.78 (3.08)	17.73 (3.01)
95% Confidence Interval	18.40 - 19.15	17.37 - 18.09
Median	19	18
Range	11 – 26	11 – 26
Difference in means	-1.04	95% CI -1.56 – -0.53

## *Training*

Decision makers who responded from the random sample of farms had not, in the main, received any formal training in the previous 6 months. This was with the exception of formal training in the use of chemicals. For almost every hazard, the proportion of seriously injured persons who had received training in the previous 6 months was higher – see Table 30

**Table 30: Recent training – percentage who had received formal training**

	AB-sr			ACC-sr		
	n	N-n	%	n	N-n	%
a. Tractors	1	239	0.4	24	221	9.8
b. ATVs	0	240	0.0	14	231	5.7
c. Chainsaws	5	235	2.1	13	232	5.3
d. Chemicals	37	203	15.4	34	211	13.9
e. Harvesters	2	238	0.8	5	240	2.0
f. Firearms	10	230	4.2	12	233	4.9
g. Heavy vehicles	5	235	2.1	11	234	4.5
h. M/cycle	0	240	0.0	9	236	3.7
i. Horses	0	240	0.0	5	240	2.0
j. Stock	2	238	0.8	16	229	6.5

44% of decision makers from randomly selected farms, and 41% of recently serious injured responders had attended a FarmSafe™ course – predominantly the FS Awareness course. 10 and 11 responders, respectively (AB-sr/ACC-sr) had attended at least one FS Skills course. These were predominantly related to agrichemical handling and chainsaw skills for AB-sr, and was more evenly distributed across ATVs, chainsaws, tractors and agrichemical handling for ACC-sr.

## *Safety checks*

14% of AB-sr and 23% of ACC-sr responded that a formal safety check had been made on the farm in the previous 6 months. This was more likely to have been carried out by OSH or a contracted safety consultant for ACC-sr (32% vs 42%), suggesting that in some instances the check was a result of the prior serious injury occurrence. Amongst AB-sr, a guide had been used in the majority (71%) of instances. Action was taken as a result of the safety check in 41% and 34% of cases, respectively.

## ***Barriers to Safety***

We asked about conditions that might affect the responders' ability to work safely. The results are shown in Table 31

**Table 31: Factors that may present barriers to safety – percentage identifying the barrier at least some of the time.**

	AB-sr			ACC-sr		
	n	N-n	%	n	N-n	%
a. Having to rush	156	84	65.0	156	89	63.7
b. Being tired / fatigued	147	93	61.3	162	83	66.1
c. Lack of equipment	60	180	25.0	64	181	26.1
d. Pressure from neighbours, co-workers, management	22	218	9.2	44	201	18.0
e. Lack of interest in farm safety	19	221	7.9	19	226	7.8
f. Lack of knowledge re safe practices	26	214	10.8	27	218	11.0

Having to rush (65%) and being tired/fatigued (61%) were the most prevalent conditions amongst AB-sr. Additionally, 25% of responders indicated that lack of equipment would present barriers at least some of the time. There were similar responses from ACC-sr, although pressure from neighbours, co-workers or management was also identified by some, affecting 18% of responders ability to work safely at least some of the time

## ***Barriers to and promoters of interventions***

Access to safety information was reported to be high for responders from both samples (88%/89%). Additionally, most responders from both samples regarded that the safety information that they had access to was easy to put into practice (83%/85%).

Amongst AB-sr, the percentage who identified barriers was as follows: cost (24%), access to reliable safety equipment (17%), lack of time (44%), access to practical information (21%) and other (34%). The responses were similar from ACC-sr.



## *Discussion of results*

### **Respondent characteristics**

The majority of responders from the AgriBase™ sample were the main decision maker on the farm. Focusing solely on this group, on the whole they were mature in both years and experience and rated themselves as having high working capacity. In contrast, the responders from the ACC sample (of persons seriously injured whilst working) were seventy percent decision makers, thirty three percent farm workers, and five percent family members. Our risk factor review (Report 1) found an association between fewer years of farm experience and increased risk of machinery-related injury. [32]

Many of the ACC-sr were mature in age and experience, although less so than the AB-sr. Our risk factor review found that, in North America, being less than 45 years is associated with a higher risk of low back injury / pain. The older age groups are associated with increased incidence of injuries (including fatal injuries) in general, but specifically with MSCs (particularly neck and shoulder), tractor and horse-related injury. [32]

Seventy six percent and 81% of our respondents were male (AB-sr and ACC-sr, respectively). Again, from our review: Males have higher risk of fatal and non-fatal injury on farms (as well as musculoskeletal problems) across all age groups. Part of the explanation for this is related to exposure. Additionally, men with a prior history of injury are at even greater risk of further injury. [32]

The majority of the ACC-sr rated themselves as having high working capacity; however, the proportion with lower working capacity was greater than for AB-sr. This is not surprising, given the ACC responders had all experienced a serious injury, resulting in time off work or reduced working, in the previous 6 months.

The majority of respondents were New Zealand European (90% for AB-sr, 80% for ACC-sr), with a small proportion who indicated they were Maori (2% and 8% respectively). Previous work has suggested greater rates of fatal injury amongst Maori;

however, it is uncertain what effect errors in classification of ethnicity played in this earlier work. [33]

## **Farm Characteristics**

Few AB-sr or ACC-sr indicated that their farm was a lifestyle block. Of the remainder, the respondents from both samples mainly comprised sheep, beef or dairy farmers. Previous work has found higher injury rates in sheep and beef cattle farming, as well as in cereal and poultry production. [32] When sampling, by far the greatest number of serious injuries were classified on the ACC claims data as dairy farmers – indicating that this group is also at high risk of injury.

There was a mix of farm sizes, and terrains in both samples, with approximately 1/3<sup>rd</sup> plains, 1/3<sup>rd</sup> rolling, and 1/3<sup>rd</sup> hill, high or mixed terrain. Most farms had 1 or more resident adults, and 27% and 19% had 4 or more resident adults, respectively.

All the respondents' farms had features that were injury or disease hazards. Comparing the results for our sample of farms (AB-sr) with the Houghton and Wilson survey, our respondents reported a smaller proportion of dams/ponds (51% vs 82%), high voltage overhead power-lines (43% vs 60%), and stables (13% vs 23%), but a higher proportion of silos (28% vs 20%). [26] Our review found, in Australia, that bodies of water on farms were associated with increased risk of fatal injury from drowning amongst children. [32] Amongst our random sample, 51% had dams/ponds, and 73% had rivers/streams on their property.

## **Occupational Disease**

### **Illness and disease in the last 12 months**

The rate of reporting of chemical related illness (once only for the AB-sr and the ACC-sr) was low. A previous survey in Southland showed a prevalence of “chemical related illness” of 24%. [34] On the other hand, in the current study, hypertension had a high prevalence amongst AB-sr (15%), in contrast to the Southland survey that had only 6% with some degree of hypertension. [34] Gout and arthritis were next highest in

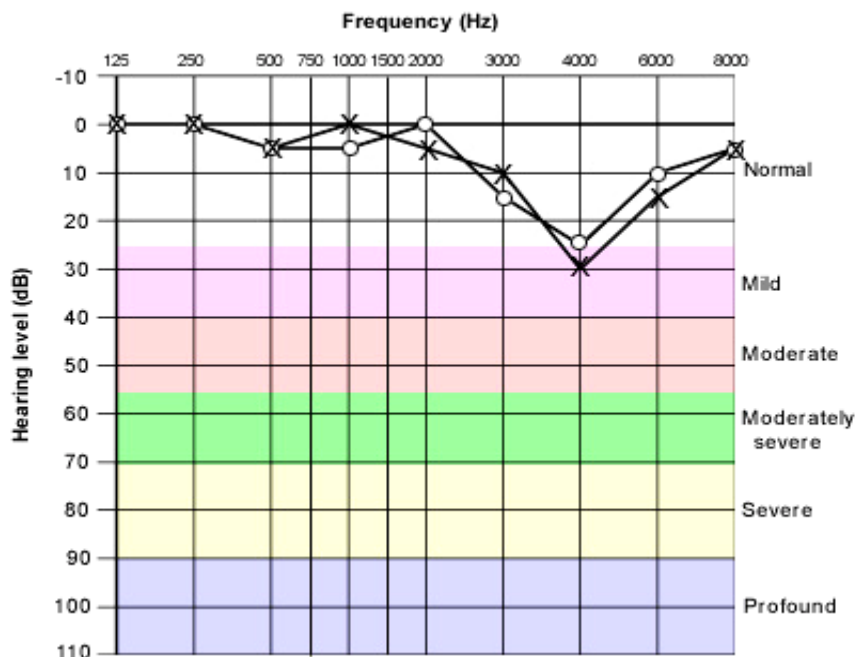
prevalence at 13% amongst AB-sr. The number of reports of diabetes amongst AB-sr was similar to the national “average” prevalence of 4%, [35] as was bronchitis at 4%. The 4% with prior heart attack or stroke is lower than the all population national estimate of 7% [36].

### Conditions in the previous 12 months

A cough lasting for longer than 3 days was the most common condition reported amongst AB-sr. This was followed by Noise Induced Hearing Loss (NIHL), with prevalences of 19% (AB-sr) and 13% (ACC-sr). These proportions are similar to the 17% of farmers identified with NIHL in a cross sectional survey using the standard Department of Labour criterion: ie. an increase in audiometric threshold at the most “noise sensitive” frequency, 4 kHz, of at least 30 dB, with evidence of a “notch” at 4 kHz – see

Figure 2. The 4 kHz threshold must be 15 dB worse than the 3 kHz threshold with a threshold at 6 kHz better than that at 4 kHz. [23]

**Figure 2: The audiometric “notch”.**



Hay fever and asthma requiring medication were also common, with prevalences of 13% and 19% for hay fever, and 7.5%/10% for asthma requiring medication in the AB-

sr and ACC-sr, respectively. The asthma prevalence in New Zealand is known to be high - up to 12%. A previous study in Southland farmers found 6.8% with Asthma, but only 4.6% taking medication. Previous work suggests that farm exposures may be protective against both disorders in adults and in children, and a cross sectional study in New Zealand seems to support this. Comparing a farming population with referents showed prevalences of asthma requiring medication of 7% and 11% respectively. [37] The rates in our sample (7-10%) may therefore represent a lower risk of asthma.

### **Musculoskeletal symptoms in the previous 12 months**

Due to the heavy nature of farm work, musculoskeletal complaints (MSCs) are common in farmers and farm workers. The 64%/67% (AB-sr/ACC-sr) reporting “Backache” is similar to the low back pain (LBP) reported in 57% of male farmers in a cross-sectional survey, and greater than the 51% of young males in a 26 year old cohort. [38] Reported shoulder and neck pain (57%/58%) was also common in the current survey, and similar to the approximate 60% in a cross sectional survey of nurses, postal and office workers. [39]

Lower limb pain was less commonly reported in the AB-sr (37%) than other MSCs in this survey. Osteoarthritis of the hip and knee are both suspected to be associated with farming. [22] There was higher reporting of lower limb problems in the ACC sample, with approximately twice the odds of an ACC-sr reporting such problems than AB-sr (OR=1.93. 95% CI 1.27-2.94). The ACC sample was chosen since they had recently experienced a serious injury. Injury, in this context, includes musculoskeletal disorders.

### **ACC claims for illness / disease**

A small but significant proportion of AB-sr with MSCs resulted in a claim being made. The total number of new work related paid weekly compensation claims made to ACC in Agriculture in 2005-2006 was 2,625 at a cost of 11.5 million dollars (Table 32 and Table 33). Low back pain (LBP) accounted for 16% of these claims.

**Table 32: Total new and ongoing work related paid weekly compensation claims**

		New		Ongoing	
		No	Cost	No	Cost
A01 Agriculture	1995-07/1996-06	2,992	7,857	1,639	18,531
	1996-07/1997-06	2,465	6,507	1,561	18,333
	1997-07/1998-06	2,320	6,826	1,417	16,736
	1998-07/1999-06	2,152	6,362	1,312	16,191
	1999-07/2000-06	908	2,817	1,084	13,565
	2000-07/2001-06	2,270	7,150	776	11,336
	2001-07/2002-06	2,712	9,316	956	12,000
	2002-07/2003-06	3,016	12,326	972	13,207
	2003-07/2004-06	3,021	12,742	1,108	14,480
	2004-07/2005-06	2,915	11,910	1,183	15,547
	2005-07/2006-06	2,625	11,478	1,112	15,038

Cost in 000s.

**Table 33: Total new and ongoing work related paid weekly compensation claims for low back pain.**

		New		Ongoing	
		No	Cost	No	Cost
A01 Agriculture	1995-07/1996-06	696	2,789	699	9,567
	1996-07/1997-06	581	1,963	635	9,471
	1997-07/1998-06	540	2,315	593	9,308
	1998-07/1999-06	498	2,117	537	8,524
	1999-07/2000-06	155	765	406	7,356
	2000-07/2001-06	329	1,497	301	5,507
	2001-07/2002-06	411	2,154	294	6,106
	2002-07/2003-06	482	2,853	278	5,649
	2003-07/2004-06	510	3,154	296	5,936
	2004-07/2005-06	425	2,392	300	6,085
	2005-07/2006-06	422	2,778	256	6,018

Cost in 000s

## Injury

In previous work, it was found that the rate of on-farm fatal injury was 9 per 100,000 per year; the rate of on-farm injury hospitalisations was 2.9 per 1,000; and the rate of compensated ACC claims was 28.5 per 1,000 per year. [2] These were claims for loss of earnings beyond the seventh day, loss of enjoyment of life, and for medical expenses.

Thirteen percent of farm managers from randomly selected farms (AB-sr) had had an injury in the previous 3 months that had restricted their activity for half a day or more or which required treatment or advice from a health professional. This represents around 43% over the course of 1 year. This rate is higher rate than the rate of 26-29% per year observed in a study of Southland farmers and farm workers over a 12 month period. [40]

On the whole, the injuries found in the current study were reasonably serious. The majority of responders who had been injured rated their current work capacity as poor. For most of the injuries reported (87%), the farmer consulted a health professional. For two thirds, it was over a week before they could return to normal farming duties. (Despite this, only a third of these made a claim to the ACC.) The most frequent injuries were sprains and strains, predominantly to the back, cuts to head, wrist/hand or multiple body sites, crush injuries to chest, ankle/foot, wrist/hand, shoulder/upper arm or multiple sites, and bruises to the lower leg or to multiple sites. The summer had the highest estimated crude rate (40 per 100) with spring the next highest (13 per 100). The majority took place outdoors. Most of these took place in what seemed to be the least hazardous conditions, namely three-quarter occurred on flat terrain, and nine-tenths whilst it was fine and dry.

We sampled people who had been seriously injured and had received earnings-related compensation from the ACC for over 3 weeks. The majority of injuries relate to: sprains and strains, mainly relating to the arms, legs, and back; fractures, mainly of the arms and legs; as well as dislocations, crush injuries, loss of consciousness, as well as amputation. Like AB-sr, the majority took place outdoors. Just over half took place on flat terrain, and 4 fifths when it as fine and dry; in the least hazardous conditions. At

the time of interview, almost all rated themselves as incapable of work, or that their work capacity was poor.

For AB-sr, almost half of all events involved animals, and almost a third were vehicle related. For ACC-sr, many of the events involved machinery (including vehicles) and animals. A study using data from the late 1980s / early 1990s found that injuries resulting in hospital admission involved agricultural machinery, tractors, motorcycles/ATVs and horses (mainly involving a fall from the horse); with a smaller proportion involving animals. [2] Animal related events on average resulted in a shorter time in hospital than vehicle/machinery-related events.

Other recent work found the following proximal causes of acute injury for sheep, beef and dairy farmers: ATV use, struck by animals, stock handling, lifting, and slips, trips and falls. [15-17] Our review found that, in Canada, falls and machinery were consistently in the top three causes of injury for each age group. In an Australian study, falls (as a mechanism of fatal injury) was associated with horses, machinery / vehicles, natural features, and stockyards. For hospitalisations, falls were associated with horses, machinery/vehicles, ladders, trees and fences. [32]

### **Work environment – Physicochemical hazards**

The most prevalent physical exposure was that from vehicle vibration, with 33% of respondents reporting such exposure. In a recent study of Southland farmers [41] showed that, in a sample of 60 farmers over a 4 hour monitoring period, harvesting, soil cultivation, spraying and transporting accounted for 23% of the time monitored. All these activities, which use farm vehicles, have the potential for whole body vibration, with shock vibration being more common in all terrain vehicles (ATV's). [42]

The noise question asked about “noise so loud that you had to shout”, and this was reported by 14% of respondents (AB-sr). This may under-represent the true nature of noise in farming, because the noise exposure on farms, is often in excess of the New Zealand 85 dB(A) exposure limit. [41]

Several forms of dust exposure were reported: that of biological origin (animals, plants etc) was most frequently reported (AB-sr 27%; ACC-sr 39%), followed by mineral dust (AB-sr 11%; ACC-sr 15%), and “other” vapours and dusts (AB-sr 4%, ACC-sr 12%). In a study of dust exposure on 60 farms, only one result was above the 10 mg/m<sup>3</sup> “nuisance” dust exposure limit. However, tasks being carried out by those with higher dust levels included:

- ploughing using a tractor without a cab,
- shearing,
- moving grain using open systems (including bagging oats),
- sweeping out sheds, and
- riding on gravel roads on a motorbike.

Such dust exposure may be protective. [37]

Handling hazardous substances was quite high in this current survey, with 10% of respondents reporting such exposure “often”. If we include those who “sometimes” handled substances, this increased the prevalence to just over 50% of respondents. This is less than the 65% of males who reported current hazardous chemical use in a previous survey. [43]

Herbicides were the most commonly used chemicals reported in the current survey (AB-sr 84%; ACC-sr 72%). Reported exposures in this survey were 57% to 84% (AB-sr) and 48% to 76% (ACC-sr) across all of the chemical types included in the interviews: ie. herbicides, pesticides, dips and drenches, paints, oil products, fertilizers, disinfectants, detergents, rodenticides, and animal health products.

The survey asked about protection from chemical exposure. In general, trunk and extremities were most often protected, but face and eyes much less so. Hand protection was highest for rodenticides (AB-sr 56%; ACC-sr 60%). PPEs were most often reported being used against dips, drenches and rodenticides, and least often reported for paints and oil products.



When looking at protection from herbicides, the trunk and extremities were most often protected, with the majority of both samples using such protection. The face, respiratory system and eyes were much less likely to be protected.

Health effects from chemicals were reported in 2.5% by AB-sr, and 5.3% by ACC-sr. Eleven out of the 13 chemical exposures reported by ACC-sr affected the farm routine, whereas none of the exposures from the AB-sr did so. Medical treatment was required for most of the exposures reported by the ACC-sr (11 out of 13), but only 2 out of the 6 were reported to require treatment in the AB-sr.

Most respondents mixed chemicals, 63 and 57% of the respective sample respondents. Coveralls, boots and gloves were worn relatively more often (AB-sr 62; ACC-sr 77%) than other types of PPEs, but the use of masks, respirators and face protection was low (AB-sr 20%; ACC-sr 20%).

## **Work environment – Ergonomic stressors / factors**

Consistent with reported high levels of exposure from vehicle vibration (33%), 32% of both AB-sr and ACC-sr describe working on the farm in a sitting position. Other than farm office based activities, the predominant at-risk sitting posture [29] when working on NZ farms is likely to be vehicle based - using quad bikes, tractors and other farm vehicles.

In recent investigations of quad bike use on NZ farms, very high levels of whole body vibration exposure, and a high level of unreported ATV loss of control events have been found. [42,44] Whole body vibration exposure in a sustained sitting position is considered to be associated with excessive and cumulative spinal loading. Recent evidence indicates that such vibration exposure can significantly alter and delay proprioceptive and balance responses which can last for 1 to 2 hours. [45,46] This effect is considered to be a plausible mechanism for creating adverse changes to posture or balance control that would place the farmer at risk of injury from either compromised lifting strategies, or increased risk of vehicle rollover. [47]

Bending without support (AB-sr 26%; ACC-sr 32%) and lifting or manoeuvring heavy loads (23.0% and 37%, respectively) in twisted work postures (14% and 18%) that are often described as painful and tiring positions (13% and 19%) are consistent with the typical stock work that many farmers undertake with sheep, cattle and other farm animals. Classical farm activities involve the sustained and stooped postures involved with lambing, calving, drenching, inoculating and generally attending to farm animals to optimise farm productivity. In particular, crutching<sup>1</sup> and shearing of sheep is an on-farm activity required of most sheep farmers either by using a contractor or by the farmer undertaking periodic bursts of these tasks prior to sending stock for slaughter, harvesting wool for market, or getting stock ready for mating.

A considerable amount of recent biomechanical and ergonomic research has investigated shearers and shearing tasks. [48] Shearing results in very heavy workloads, placing the shearer (or farmer undertaking the shearing tasks) under considerable spinal loads, in twisted work postures [49] requiring high levels of energy

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<sup>1</sup> Sheering wool and dags away from the tail end of the sheep

[50]. The cumulative spinal loads and injury risks from these shearing/crutching work tasks, such as the “catch and drag”, [51] and sustained postures during “fleece removal”, are considerable [48] and yet are accepted as routine work activities by the majority of sheep farmers/contractors.

The high levels of repetitive hand/arm movements (AB-sr 44%, ACC-sr 62%) described by these farmers/workers is also consistent with stock work such as drenching/shearing/crutching and other chores required of the farmer, eg. farm maintenance activities such as fencing. Similar to the low back injury risk associated with shearing injury, the risks (and costs) of upper limb/hand injuries are known to be high in the shearing workforce. [52] Only a small number (13% and 18%, respectively) described working with their arms raised. Given the nature of most stock work, this is not surprising.

Despite the considerable majority (97% for both AB-sr and ACC-sr) of farmers describing themselves as being well- to moderately well-informed about risk factors for injury, only 54% (AB-sr) and 61% (ACC-sr) reported using protective equipment “always” or “often”. A number of protective devices (eg. lifting and drenching cradles, shearing and crutching back harnesses, and upright posture crutching devices) are available. [48] Explanations / barriers for the use of such protective equipment could include: fatalistic attitudes towards injury risk; the need to get a job done “no matter what”; farmers independent “can do” attitude; and perhaps historical farming practice [53], as well the cost and availability of these devices.

## **Work environment – Psychosocial factors**

### **Job stressor prevalence**

Having a farm-related accident and unpredictable farming-related factors, such as machinery breakdowns, were common sources of stress for farmers in both groups surveyed.

Comparisons between the two samples indicate, unsurprisingly, that those with a recent serious injury were significantly more likely to report increased seasonal workloads and having a farm related accident as stressors and less likely to report adjusting to new government regulations and policy as stressors. Additionally, those with a recent serious injury reported a higher median stress score for having a farm related accident compared to the comparison sample (median score 3 “stressful” compared to median score 2 “slightly stressful”).

The questions on farm stressors employed in this study were derived from the top 16 farm stressor scores used in a previous New Zealand study. [30] Firth and colleagues’ (2006) research involved a cross-sectional sample of Southland farmers and in that study the most prevalent self-reported stressors were: “increased work load at peak times”, “dealing with ACC”, ‘bad weather” and “complying with the Health and Safety in Employment Act”. Dealing with governmental bureaucracy was also a common source of stress for farmers in Britain. [30]

Our study is the first to investigate stressors in those farmers who have had a recent serious injury on the farm. Clearly for those respondents who had a serious injury the sources of stress on the farm change to some degree, with stress generated around dealing with governmental bureaucracy replaced by stress generated around coping with the impact of farm related injuries upon farm work demands.

## **Work organisation**

### **Working hours**

The longest median working hours for both the AB-sr and ACC-sr occurred in Spring and Summer. There appears to be little difference in season-specific median working hours between AB-sr and ACC-sr. As expected, winter median working hours were the shortest, with a median of 7 hours worked per day, while spring working hours were the longest with a median of 10 hours worked per day. Maximum working hours suggest that for some respondents work on the farm involves extremely long days with maximum working hours of 15 to 20 hours per day reported across the farming seasons. New Zealand census data indicates that Agricultural and Fishery Workers work the longest hours of the entire labour force with 31% of full-time workers in

agricultural and fisheries working greater than 60 hour per week, double that of the second and third ranked major level occupations of Legislators, Administrators and Managers (17%) and Plant and Machinery Operators and Assemblers (16%) (Statistics NZ, 2008).

This survey's results indicate that respondents are working many days of the week throughout the year, with half taking off only one day or less per week.

With long working hours and working weeks commonplace in farming there would be little opportunity for recovery from the physical and mental demands of farming. Therefore it is highly likely that fatigue would be common in this group. The potential impact of fatigue on workplace safety is well recognised: long working hours and the resulting restricted sleep opportunities are risk factors associated with an increased risk of injury at work through the intermediary condition of fatigue. [54,55] Long working hours are a risk factor for injury in farmers. [56-58]

### **Business arrangements**

A greater proportion of ACC-sr farms were in partnership arrangements. Exactly what form the partnership took is not captured by this survey, but "partnerships" is likely to capture farming couples and family partnerships. Business partnerships would be expected to be captured by the "registered company" category. It is possible that family partnerships are less likely to employ workers to work on the farm property and without formal employment obligations are less compelled to undertake farm health and safety management, possibly resulting in poorer health and safety conditions on these farms. [59]

A smaller proportion of the ACC-sr farms were registered companies (11% of ACC-sr compared with 19% of AB-sr). If this represents a real difference between ACC-sr and AB-sr farms, it indicates that registered companies are associated with a lower risk for serious injury. This may arise due to the agribusiness' legal obligations to employers under the Health and Safety in Employment Act to eliminate, isolate and mitigate farm hazards. [59] This potential relationship deserves further investigation.

## **Employees**

For the vast majority of both sample respondents who worked on farms with employees, the employees were employed in an on-call or a casual employment arrangement. Overall, respondents reported that their farms used more flexible contract arrangements for employees; only 1 in 4 employees were on permanent contractual arrangements.

ACC-sr farms were more likely to have employees working as sub-contractors than AB-sr. It is hypothesised that farms that are more likely to sub-contract out portions of farm work may have poorer health and safety conditions. Sub-contracting is recognised in other industry groups to result in poorer occupational health and safety conditions: both for the employees on sub-contracts, and within the worksites where sub-contractors are employed. [60]

## **Multiple job holding**

One in three of the AB-sr held more than one job, while only one in eight held more than one job amongst the ACC-sr. The second job was unlikely to be permanent, unlikely to be supported by an employment contract, and likely to be of less than 6 months in duration. These results suggest that those with multiple jobs were engaged in temporary or casual secondary employment.

There was a lower prevalence of multiple job holding amongst ACC-sr than AB-sr - holding multiple jobs was not associated with an increased likelihood of serious disabling injury amongst those in this study. This appears contrary to the seasonal worker research conducted by the Department of Labour in 2007. [61]

## Children

Our survey identified that children of all ages were engaged in farm work in New Zealand – even some very young children aged less than 5 years of age. There were distinctive patterns of exposure by age and gender.

The patterns of children's involvement in farming have changed little since the survey of Houghton and Wilson published in 1994. [26] By their teenage years, male children were still more likely to be undertaking activities on the farm, such as operating machinery, operating farm workshop machinery and playing near machinery, than female children.

Of concern is a possible increase in the use of ATV's in children. Houghton and Wilson's 1994 farm safety survey results showed 12% of children aged between 4-11 and 27% of those aged 12-15 yrs "sometimes" or "always" operated ATV's. [26] Although not directly comparable age groupings, in our survey 4.5% of 5-9 year olds and 39% of 10-15 year olds were operating ATVs on the farm. The use of ATVs on farms by children is of concern as children less than 15 years of age seldom have the level of cognitive or physical development to operate agricultural vehicles designed for operation by an adult in a safe or controlled manner. [62]

The information from this survey can be used to target farm safety interventions to appropriate age groups. Of concern, and hence the potential focus of intervention, are the following behaviours and/or exposures:

- Very young children aged <5years: riding on farm vehicles as passengers; exposure to animals; and accompanying adults onto farm worksite.
- Young children aged 5-9 years: riding farm vehicles as passengers; early operators of ATVs and motorbikes; playing near machinery; access to farm structures; animal work; early uptake of firearms; and accompanying adults onto the farm worksite.
- Older children 10-15 years: operating farm machinery; riding farm vehicles as passengers; playing near machinery; access to hazardous farm

structures/features; working with animals; using firearms; and accompanying adults while adults working.

Suggested interventions to reduce the likelihood of child farm-related injuries that have favour with farming parents include: providing close supervision of children while on the farm, providing education and training specifically to children on farm hazards; and the restricting the access of children to the farm site. In regard to work activities, the adaptation, introduction, promotion, and adoption of guidelines for parents of children (developed by other countries) could be a way forward. [63]

Respondents also suggested that safety is common sense and that children should take more care. This indicates little understanding of injury control principles. This would seem to suggest that education and training is needed not just for children but for parents also.

There are a number of significant policy inconsistencies covering the use of ATV's and tractors by children in New Zealand. [64] Current legislation prohibits children under the age of 15 years of age from operating ATVs on the road (including beaches). However, on farms, OSH guidelines indicate children under the age of 15 years **should** not operate an ATV, and children under the age of 12 years **shall** not operate an ATV on the farm. [65] There is a list of exemptions to these guidelines that allow children aged between 12-15 years to operate an ATV around physical capability, training, etc. A quarter of the children in our study were operators of an ATV "always" or "sometimes", while close to a third were operating a motorcycle "always" or "sometimes". This is of concern given the high rates of injury associated with use of ATV's amongst children. ATV's are not designed as passenger carrying transport, especially over rough farm terrain; however, over half the children in our survey ride as passengers on ATV's on the farm. In comparison, fewer children were operating tractors (one in ten reporting tractor operation), while a third of children were riding on tractors as passengers.



## **Selected workplace exposures – vehicles / machinery / animals**

In a previous survey, working with cattle, driving tractors, working with chainsaws, working with chemicals, and riding ATVs or motorcycles was regarded by farmers as the most dangerous activities on the farm. [26] This does not list a previous major cause of injury, namely riding horses [2]; additionally, it appears to focus mainly on acute injury (with the exception of working with chemicals);. If “chronic” soft-tissue injury is also considered, we suggest that this list should also include, for example, working with sheep.

Both sets of sample respondents reported high levels of exposure to the following pieces of potentially hazardous equipment and animals:

- 2 wheeled motorcycles
- 4-wheeled ATVs
- Shearing equipment
- Tractors
  - Implements pulled by tractors
- Chainsaws
- Firearms
- Workshop equipment
- Stock

The percentages of these pieces of equipment or stock on farms in this survey differ in some important ways to the 1993/4 survey. Almost all farms in the Houghton and Wilson survey had tractors and tractor implements. That was not the case here. The use of 2-wheeled farm bikes was reported to be greater in the 1993/4 survey than the current survey. The proportion of farms with ATVs was greater for the current survey than the 1993/4 survey. [26] This reflects a shift from one working vehicle type to another over this 14 year period. Additionally, chainsaws were reported less, and firearms, milking equipment and harvesters slightly less, in the current survey. Our review found that machinery was associated with a significant risk of injury. In Canada, agricultural machinery was in the top three for risks of injury for all age groups. [32]

A recent study investigated the percentage of the total hours that New Zealand farmers and farm workers were exposed to selected pieces of equipment, for those respondents reporting that the equipment was present on the farm. The largest exposure times were for milking equipment, 4-wheeled ATVs, tractors, harvesters, 2-wheeled farm motorbike, implements pulled by a tractor, and shearing equipment. [9] In terms of stock handling, high percentages of total hours were spent handling sheep, on farms where sheep were present, horses, and cows / calves. [9]

## **Tractors**

In New Zealand, fatalities associated with tractor overturns were the most common cause of death during the period 1985 to 1994. In Australia, our review found that tractors are the most likely mechanism of fatal injury for older adults. [32]

Ninety two percent (AB-sr) and 81% (ACC-sr) reported at least 1 tractor on the farm, and 87%/76% (AB-sr/ACC-sr) reported the presence of implements pulled by tractors. Approximately half of farms surveyed had 2 or more tractors. In the USA, our review revealed that “injury” associated with tractor use exceeding 1000 hours includes neck, shoulder, upper extremity and back problems. It was found that women are more at risk of injury if taught to drive by their husband, or were reliant on their husbands knowledge. In Europe it was found that, if using a tractor for 8 hours a day over an extended period of years, this was associated with an increased incidence of vibration white finger. [32]

Amongst AB-sr responder farms, the percentage of farms where at least one tractor on the farm was missing a safety feature were as follows: roll-over protective structure (11%), enclosed cab (40%), seatbelts (56%), passenger seats (25%), guarded PTOs (9%) and safety starter (14%). Even where seatbelts were available on tractors, they were rarely used. A previous pilot study had found that these safety features were often missing, for at least one tractor on the farm. [9] Our review found that, in the USA, the use of ROPS was more likely on large farms and on farms with larger incomes. As in our study, it was found that few farmers used seatbelts. [32]

ACC-sr indicated that the above safety features were absent for a greater proportion of the farms. A high proportion of responders (both samples) reported always or often leaving their keys in the ignition when the tractor was unattended. This is a problem particularly if children can get access to the tractor.

In the 1980s, Langley and colleagues found a rate of fatal injury associated with tractors of 1 per 100,000 rural residents per year, with those in the 60+ age group having the highest rates and numbers. The rate of injuries resulting in hospital admission was 22 per 100,000 rural residents per year. Many of these occurred to persons whose primary occupation was not farming. [5] In another study, 237 fatal injuries occurred on New Zealand farms during the period 1975 to 1984. [66] Forty four percent (44%) of the fatal injuries were tractor-related, and 37% were overturns. The results of Langley and colleagues indicated that there had been a significant decline in non-fatal overturns. Falls and being run over were the most common tractor-related events resulting in hospital admission [5] The most common types of injury were fractures of the spine and trunk and of the lower limb. 42% of the tractor injury hospitalisations resulted in stays of longer than 6 days. [5]

Comparing the results from the random sample of farms (AB-sr) with the Houghton and Wilson survey suggests that now: fewer tractors lack ROPS, fewer lack seatbelts, fewer lack passenger seats, far fewer have unguarded PTOs, and fewer lack safety starters. [26] That is, there have been significant improvements of safety features in the ensuing 14 years. Having made progress with ROPS in general, the next challenge is to increase the proportion of tractors with enclosed cabs that are fitted with seatbelts, and to increase seatbelt use. The behaviour of leaving keys in the ignition when unattended seems little changed.

### **Farm Bikes (2-wheeled)**

A third of AB-sr farms, and a fifth of AC-sr farms had a 2-wheeled farm bike. Amongst those AB-sr farms that did, a high proportion indicated that it was used for transport and for mustering. A minority used the farm bike for recreation and carrying.

A similar pattern of usage was apparent for the ACC-sr; however, a smaller proportion of farms used the bike for recreation, and a larger proportion for spraying, carrying and towing. In only 19% of the AB-sr did the respondent always use a helmet, and in 11% of the ACC-sr. These percentages are greater than have previously been reported. [26]

Our review identified an Australian study of high school students, which found greater injury rates if the person was self-taught, reported that they drove at high speed, and only sometimes wore a helmet. [32]

## **ATVs**

62%/50% (AB-sr/ACC-sr) reported that there was at least 1 ATV on their farm. Amongst those AB-sr farms that had an ATV on the farm, a high proportion of respondents indicated that it was used for transport (97%), carrying (94%), towing (93%) and for mustering (84%). A minority reported that it was / they were ever used for recreation (35%). A similar pattern of usage was apparent for the ACC-sr; however, a smaller proportion of farms used the bike for recreation (25%), and a larger proportion for mustering (92%).

The ATV tended to be used every day. Amongst those farms that did use ATVs, only a minority reported that they had no go areas marked on a farm plan: 11% for the AB-sr, and 15% for the ACC-sr. Few indicated that they always used a helmet (3% for the AB-sr, 4% for the ACC-sr). Approximately half of each sample respondents indicated that they always wore work boots when using the ATV, and only 2 people ever wore a seatbelt. In their 1993/4 survey, Houghton and Wilson reported that: “Aside from wearing boots, users seldom wear gloves, helmets, protective pants or eye protection”. [26]

63% of the AB-sr reported sometimes or always carrying passengers, 18% reported that they sometimes or always get on or off a moving ATV, the majority (75%) reported sometimes or always leaving their keys in the ATV when unattended. Similar responses were obtained from the ACC-sr, except that a lower proportion sometimes or always carried passengers (54%). Each of these are hazardous behaviours.

Our review found that, for male youth, injury risk increased with the number of people riding on the ATV. In this age group, ATVs were mainly used for recreation, many did not wear helmets, and rode ATVs that were too large for their size and age. [32]

### **Chainsaws**

86%/71% (AB-sr/ACC-sr) indicated that they had at least one chainsaw on the farm. There were a high proportion of occasions where PPE were not worn whilst using a chainsaw (ie. eye protection, gloves or chainsaw mittens, chaps, and helmets).

### **Horses**

The proportions of responders who indicated that there were horses on the farm were: 17% for AB-sr, and 19% for ACC-sr. A low percentage of those respondents reported always wearing a helmet whilst riding horses: AB-sr (24%), ACC-sr (38%).

### **Stock**

The proportions of responders who indicated that there was stock on the farm were: 73% for AB-sr, and 60% for ACC-sr. Few farms had escape openings for workers in the stockyard, few reported having handrails in stockyards / handling pens, and approximately half indicated that they had head-crushers for controlling stock in these areas.

The proportions of responders who indicated that there was at least one dairy shed on the farm were: 21% for AB-sr, and 23% for ACC-sr. Safety features in the dairy shed were more apparent amongst the serious injured responders. Amongst the random sample of farms, only a minority of the respondents reported the presence of non-slip flooring, or the removal of tripping hazards. Approximately half reported RCDs on electrical switchboards, and three-quarters reported safety guards on moving parts.

Our review found that, in the USA, common mechanisms of injury were horse-related (mainly female) or cattle-related (mainly male). In this US study, horse-related injuries

were typically not work-related injuries. However, in an Australian study, they tended to occur whilst mustering or riding for leisure amongst females, whereas in males they tended to be work-related. One study found associations between large livestock on the farm and rates of farm work-related injury. Livestock related injury were associated with hearing aid use, and with diagnosed arthritis / rheumatism. [32]

Handling, management of farm animals on UK and Australian farms was associated with a high risk of injury, including the practice of tagging calves and clipping cattle. [32]

## **Workshop**

Almost all of the farms had at least one workshop. Approximately four-fifths reported safety guards on saws, planes, routers, grinders, augers and cutting blades. This was again higher than a recent pilot study. [9] A minority of respondents reported that the following safety equipment was always used: earmuffs (47%), safety goggles (49%), heavy duty gloves (13%). Boots were worn often, but not always; and residual current device (RCD) or isolators were reported to be used always by two-thirds of respondents.

## **Outdoor working**

When using electrical equipment outdoors, 82%/69% (AB-sr/ACC-sr) reported always using an isolating transformer or RCD, 76%/72% reported often or always working alone and 39%/47% reported always carrying a cell phone.

## **Work Safety Climate**

Safety climate has sometimes been considered an indicator of an overall safety culture, i.e. colloquially, “the way things get done around here”. It describes the attitudes to, and perceptions of, safety in their workplace that workers have.

For AB-sr and ACC-sr, the mean for the positive safety “practice” was almost three-quarters of the possible score, indicating that, regardless of their injury experience, the groups considered there was adequate safety equipment, training and support on the farm.

Workers who had experienced a severe injury (ACC-sr) had a marginally lower “Control” mean score than the AB-sr - suggesting that they perceived themselves to have slightly less control over the workplace. This is similar to two other studies:

- one which suggested that those who have had a previous injury were more likely to perceive themselves as having less control over their workplace; [67] and
- one which suggested that those who believed a problem was preventable were more likely to report taking preventive measures. [68]

In farming’s case, it would appear that the safety climate is similar in groups which were selected through various mechanisms; the influence of serious injury may be relatively small. There is, perhaps, an industry level safety climate present with a shared attitude to, and perception of, safety.

## **Training**

The survey asked about safety training in the previous 6 months. The respondents had not, in the main, received any formal training in the previous 6 months. This was with the exception of formal training in the use of chemicals.

Just over 40% of both samples had attended a FarmSafe™ (FS) course since its inception in 2002 – predominantly the FS Awareness course. Few had attended the FS Plans, or one or more of the FS Skills, programmes. The collective evidence is that, in adults, educational interventions (like FS Awareness) alone are able to deliver stable improvement in safety behaviour, attitudes and knowledge. There is little evidence, however, that educational interventions alone are able to deliver a reduction in injury. [69]

## **Safety checks**

Fourteen/twenty three percent (AB-sr/ACC-sr) responded that a formal safety check had been made on the farm in the previous 6 months. This was more likely to have been carried out by OSH or a contracted safety consultant for the responders who had been seriously injured (32% vs 42%), suggesting that in some instances the check was a result of the prior serious injury. Amongst the random sample of farms, a guide had been used in the majority (71%) of instances. These included the following: OHS, AgriQuality™, Federated Farmers, MAF, FarmSafe™, and European guides. Action was taken as a result of the safety check in 41%/34% of cases.

## **Barriers to Safety**

Having to rush (65%), being tired/fatigued (61%) where the most prevalent barriers to safety reported for AB-sr. Additionally, 25% of responders indicated that lack of equipment would present barriers at least some of the time. There were similar responses from the ACC-sr, although pressure from neighbours, co-workers or management was also identified, affecting 18% of responders ability to work safely at least some of the time

Explanations / barriers for the use of protective equipment could include: fatalistic attitudes towards injury risk; the need to get a job done “no matter what”; farmers independent “can do” attitude; and perhaps historical farming practice (Dean et al. 2008), as well as the cost and availability of safety devices.

## **Barriers to and promoters of interventions**

The results strongly suggest that access to safety information, or putting existing safety information into practice were not perceived as barriers to intervention. Barriers to



intervention identified from both samples respondents were: lack of time (44%), cost (24%), access to practical information (21%), and access to reliable safety equipment (17%). These results suggest that economic and other pressures subsume safety concerns on a significant proportion of farms.

## ***Strengths and weaknesses of the study***

### **Strengths**

This is the first New Zealand national study to provide a description of exposures to hazards on the farm, across a wide range of exposures – from traditional (eg. chemical exposure) to non-traditional (eg. psychosocial, work organisation). Previous work has provided exposure information relating to specific types of hazards – eg. chemical exposure [43], farm machinery [9]. This latter study was, however, a pilot study with a small sample size. There was also a survey farmers and farm workers from three farming regions carried during the spring of 1993 and Summer of 1994; however, this has limited information on risk factors for injury. [26]

### **Weaknesses**

#### *Selection bias*

Our response rate of 40% was low, but not unusually so. One of the most recent studies involving New Zealand farmers achieved a response rate of 24% from a postal survey. [9] The most comparable survey to ours in the Houghton and Wilson survey; however, the response rate was not quoted in their survey report. [26]

Our response rate could have been affected by the unusual climatic conditions during the period of the survey, which resulted in drought in some areas / at some times, and major flooding in others. The response for the AgriBase™ sample seemed to be inversely related to the likely farm workload, with the highest response occurring in

autumn and winter. The response pattern was more even for the ACC sample of people seriously injured.

This could result in bias. Morgaine and colleagues found a greater propensity to report psychological health problems in an interview survey with a response rate of 65%, compared with a postal survey with a response rate of 52%. [40] This could be due to response rate, or to interview method. The profile of respondents in the Morgaine study was also associated with response / interview method, with the postal survey being on average older, with a smaller proportion of female respondents, a higher proportion of primary decision makers, and a higher proportion employing farm workers. [40]

On the other hand, the low response rates may not be critical. Again, in the Morgaine study, the responses across all health factors measured (except the psychological one) were remarkably similar – namely injury rates, musculoskeletal problems, and respiratory problems. [40]

#### *Misclassification bias*

There may be a concern that respondents' recall of hazards on the farm does not accurately reflect the actual presence of hazards. Intuitively, if a hazard is recalled, it is likely to exist on the farm. The concern is that not all hazards are reported. A recent study, however, found that reports during interview of the farm environment closely matched the observations of hazards on the farm made during farm inspections. [9] This work found no evidence of significant misreporting. It is likely that those who have recently experienced a serious injury would be more likely to report hazards on the farm, particularly those hazards that were perceived to be associated with the injury event.

#### *Social desirability bias*

Social desirability bias is the term used to describe the tendency of respondents to reply in a manner that will be viewed favourably by others – in this case the interviewers and investigators. This will generally take the form of over-reporting "good" behaviour or

underreporting "bad" behaviour. Questions such as: "When using pesticides do you wear protective clothing to protect your face/head neck?" might elicit false positive responses since the socially desirable response is "yes". For questions such as: "How often do you get on or off a tractor while it is still moving?" the respondent might be inclined to falsely answer "rarely" or "never" since it would be perceived as socially desirable to avoid this potentially dangerous activity. The potential for social desirability bias should be considered when viewing the results.

*Uncorrected confounding.*

For the comparison between AB-sr and ACC-sr, for any of the variables in the survey, the associations will be potentially confounded by associations with other risk factors for serious injury. The comparisons described in this report should be regarded as very preliminary. A case-control analysis is in progress for which statistical modeling has been used to reduce confounding. The results of such an analysis will be far more reliable. These will be presented in a separate paper.

## ***Recommendations / Implications***

These survey results, along with the literature reviews of risk factors and of interventions, as well as the in-depth interviews of national stakeholders and farmers / workers / family members, provide the background for the formulation of recommendations relating to further research and intervention development. Consequently, we have not produced separate recommendations relating to the results in this report; the recommendations have been formulated taking account of the results across the whole project. These have been presented in the Summary report. [1] They are reproduced here.

### **Recommendations**

1. *There is common recognition of the need for an agreed upon strategy for prevention that is evidence-based. In the absence of this there will continue to be coordination issues, a lack of coherence, issues surrounding the efficacy of specific interventions, duplication of effort, and a concentration of effort at the macro level (with little or no involvement at meso- and micro- levels).*
2. *A programme for the development of appropriate interventions to reduce the burden of agricultural injury and disease needs to be formulated. It is recommended that a programme involving the development of appropriate interventions to reduce the burden of agricultural injury and disease be formulated. Any proposed intervention should be evaluated in New Zealand for efficacy in one or more trials. If found to be efficacious under controlled conditions, the proposed intervention should be tested and evaluated for its effectiveness under ‘field’ conditions. If the intervention effect is positive, only then would the intervention be implemented on a national basis.*
3. *Addressing the key injury and poor health causes. Interventions need to be designed to address the key exposure/hazards faced by the farming community. Targeted interventions have a greater likelihood of success.*
4. *Interventions need to reach beyond educational interventions and be multifaceted. Interventional approaches other than educational approaches need to be considered to*

address the multitude of mechanical, physical, biological, chemical and psychosocial hazards faced by farmers within the farming environment. Interventions that have the hierarchy of control as a keystone are most likely to succeed. We recommend the use of a multi-faceted interventional approach where interventions should be truly multi-faceted, including combinations of relevant educational, engineering/design and regulatory interventional components, where applicable.

5. *Consideration of the barriers to implementation of interventions.* Intervention design needs to consider the barriers to implementation. For example, interventions need to address and include those farmers resistant to safety improvement in farming; those with poor health and where safety conditions are far from optimal. Steps such as identifying high risk, more resistant farmers at initiation of the intervention and providing targeted interventions for these groups may improve the outcome of the intervention. Other barriers that need to be considered: economic, different definitions of what constitutes serious injury and behavioural responses to ill health, addressing perceptions of difference within the sector and ensuring that any future initiatives involve full engagement from the rural community. Dissemination of occupational health information to farmers, farm workers and their families needs to include more than written communications.
6. *Sustained support.* Interventional programs work better if sustained over time in a supportive environment (i.e. support networks, follow-up contact, booster interventions, farmer empowerment). The potential for promotional activities to build upon existing programs with sustained support should be considered (i.e. take place during times of heightened farm health and safety activity and have the support of key stakeholder groups). Interventions are more successful if programs can be delivered in a receptive environment and having rural community involvement in the design of interventions is important.
7. *Novel farm health and safety interventional approaches and leadership.* Many approaches target the farmer or farm manager and attempt to influence through the farmer as the key decision maker in the farming operation. There is a whole chain of people involved in agriculture who may be used to influence agricultural health and safety (i.e. financial and insurance groups, commodity groups, commodity purchasers,

contractors and farm workers and their families). Alternative targets for intervention also need to be considered.

8. *Pilot testing interventions in the New Zealand agricultural context.* Any future interventions targeting the agricultural industry in New Zealand need to be piloted and evaluated for effectiveness in reducing agricultural injury and disease in the New Zealand agricultural context (for NZ farmers and on NZ farms), before being implemented nationally.

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# Appendix 1: AgriBase™ Sample

## AGRIBASE™ DATA SUPPLY DETAILS

### 1 Data Supply Specifications and Purpose

- 1.1 Data will be supplied as set out in Section 1 of this Service Agreement.
- 1.2 Data will be supplied to The Customer as outlined in section 2 of this Schedule (Schedule 2), for the specific purpose(s) of:
- 1.2.1 Facilitating The Customer's survey requirements, specifically relating to: **the research project "Effective occupational health interventions in agriculture: key characteristics of their development and implementation in New Zealand"**
- 1.3 Any maps, written papers or products using or referring to the Data will include a reference stating that AgriBase™ data is a product of AgriQuality™ .
- 1.4 Any reference to AgriBase™ will include the Trademark™ superscript immediately to the right of the word "AgriBase."
- 1.5 Any products or written papers using or referring to the Data will not divulge information about individual farms, or be presented in a way that can be used to infer information about an individual farm.

### 2 Detailed Data Supply Specifications

- 2.1 AgriQuality™ will provide the Customer with a data sample of 300 farms total per quarter.
- 2.1.1 Specifically, data will be provided early July 2007, early October, 2007, early January 2008, early April 2008.
- 2.2 Each data sample will be provided in Excel format and will include the following data fields:

Data field	Type	Size	Description
farm_id	Char	7	Unique farm identifier assigned by AgriQuality™ Limited
locality	Char	40	Name of nearest town / locality
dec_mkr_initial	Char	12	Initials of the person normally used for contact regarding farm business
dec_mkr	Char	50	Surname of the person normally used for contact regarding farm business
postal_1	Char	80	Postal address 1 of the person normally used for contact regarding farm business
postal_2	Char	80	Postal address 2
postal_3	Char	80	Postal address 3
postal_rd	Char	5	Rural Post RD number
postal_4	Char	80	Town associated with postal address
home_ph	Char	40	Residential Phone of the dec_mkrs
size_ha	Float		Total area of the property in hectares as reported by farmer/occupier, rounded to one decimal place
type	Char	3	The predominant land use on the property (refer Farm Type lookup table below)

Confidential to The Customer and AgriQuality™

2.3 The 300 farms per data sample will consist of 60 farms for each of the following strata:

1. Sheep - defined as those farms with Farm Type code SHP
2. Beef - defined as those farms with Farm Type code BEF
3. Dairy - defined as those farms with Farm Type codes DAI, DRY
4. Horticulture & other crop growing - defined as those farms with Farm Type codes ARA, FLO, FRU, NUR, OPL, VEG, VIT
5. Other Livestock - defined as those farms with Farm Type codes API, DEE, EMU, GOA, GRA, HOR, OAN, OST, PIG, POU, SNB

2.4 AgriQuality™ will ensure that no farms provided will be included in more one sample.

### **3 Responsibilities of the Customer**

3.1 At the end of each quarter, The Customer will provide to AgriQuality™ a list in Excel format of farm ID's where the contact details provided were incorrect.

- 3.1.1 Any other known correct contact details or farm type information will be included against the farm ID in the Excel list provided.

## Appendix 2: Request for ACC data

### ***Form - Data Requests From Researchers External to ACC.***

1. Researchers requesting access to ACC data should, before completing this form, consult first with their sponsor within ACC, or in the absence of a sponsor, Research Services at ACC, to discuss the reasonableness of the request from ACC's perspective. Establishing this test of reasonableness though does not guarantee that the request will proceed.
2. Researchers who believe they may require ethics approval from an appropriate committee for the data request may complete and submit this form first, to ensure that ACC is willing to co-operate. Once preliminary approval is given the ethics certificate must be obtained and a copy sighted by ACC before the data request is completed.
3. If ethics approval has already been obtained please include a copy with this form.

Please complete the following details and sign -

1. **Title of study:** Effective occupational health interventions in agriculture: key characteristics of their development and implementation in New Zealand

2. **Date of application:** 23-May-07

3. **Contact details:**

3.1. **Name of Principal Investigator:** Associate Professor Colin Cryer

3.2. **Address of Principal Investigator including email:**

Injury Prevention Research Unit  
Dunedin School of Medicine  
University of Otago  
P O Box 913  
Dunedin

[colin.cryer@ipru.otago.ac.nz](mailto:colin.cryer@ipru.otago.ac.nz)

3.3. **Name of Institution:** University of Otago

3.4. **Name of sponsor within ACC:** Sponsored by ACC via Occupational Health and Safety Joint Research Portfolio funding.

4. **Contract details**

4.1. **Is the data request being done in partial fulfilment of a contract with ACC or other research organisation.** Yes

If so -

4.2. **Name of ACC Division with whom contract is held:** Contract is with the Health Research Council.

4.3. **Name of contract:** Megan Skinner

- 5. Outline of study for which the data is required (not more than two pages).  
Alternatively, Researchers may attach the outline as a separate document.  
The outline may include -**
- 5.1. Background**
  - 5.2. Aims**
  - 5.3. Methods**
  - 5.4. Relevance of the study to ACC**

*Background:* Agriculture is an important part of the New Zealand economy, contributing over 60% of our export earnings and employing 9% of the total New Zealand workforce. Occupational ill health in agriculture is a serious public health problem; it contributes disproportionately to ACC claims and associated costs. It is important to take stock to identify the best ways to address this problem.

There have been a number of NZ and overseas studies that have described the problems of occupational injury and disease in the agricultural sector, investigated hazards and risks, exposures, and also the effectiveness of interventions. This literature is limited in a number of areas, particularly in the description of levels of exposure of workers and their families on NZ farms, and barriers and critical factors to facilitate intervention.

*Aim:* to provide an up-to-date knowledge base from which the ACC, DoL and other stakeholders will be able to introduce or modify targeted interventions that will reduce the rates of injury and other harm to members of the target population.

*Objectives:* For the target population, to identify: (a) Key agriculturally-related hazards and risks; (b) Evidence-based effective interventions that address these hazards and risks; (c) The barriers to implementation and adoption of the key interventions; (d) The critical factors that need to be considered when designing and implementing those interventions.

*Target population:* This includes those directly employed in agricultural production, ancillary workers who directly support agricultural production, and their partners and families.

*Design:* In line with 'Key Activities' in the Request for Proposals, the proposed approach includes: an update of recent literature reviews; a survey of the population to describe problems, exposures to hazards and risks, interventions that are in place, and barriers and critical factors relating to implementation of these and other interventions; face-to-face interviewing of selected farmers, farm workers and their families to provide a more in-depth look at these same issues; interviews of stakeholders to get their perceptions of the same; analysis of the impact of effective interventions if implemented successfully; and finally, synthesis of the information to address the aims.

The project will be managed through a methodological steering group and a stakeholder reference group.

*Main Outcome measures:* A specific anticipated outcome will be a report that addresses each of the aims described above. At the very best, this will provide a knowledge base for use by stakeholders, including ACC and DoL, to identify and develop effective methods for the implementation of evidence-based interventions that are likely to offer the greatest health and safety benefits for this population. At the very least, it will identify a research agenda aimed at this outcome.

## 6. Ethics requirements

- 6.1. **Has ethics approval been sought at any time for this study whether successful or not?** Yes
- 6.2. **Are personal identifiers required in the dataset?** Yes – They are required to contact claimants (persons injured whilst working on a farm) as part of the proposed telephone survey.
- 6.3. **If personal identifiers are required will the clients of ACC be contacted at any time?** Yes
- 6.4. **Briefly identify any relevant ethical issues in the space below.**

Maintenance of the confidentiality of the data.

Destruction of the data once it is no longer needed for the project and for the purposes of compliance with academic or ethical standards.

## 7. Details of data requested

### 7.1. List of data fields required-

The data fields required are shown in the attachment to this data request.

### 7.2. Date data required by.

The first data set is required in early July 2007, and the second before mid-July.

The process will be repeated 3 other times (3 months apart) during the year.

## Declaration by Principal Investigator:

1. The information supplied in this application is, to the best of my knowledge and belief, accurate.
2. I have considered the ethical issues involved in this research and believe that they have or will be adequately addressed.
3. If the protocol for this research changes in any way I will immediately have the research programme stopped and advise ACC, and if appropriate, the relevant Ethics Committee. The programme will not be recommenced until approvals are given in writing by ACC and/or the relevant Ethics Committee.

**Name :** Peter Colin Cryer

**Signature of Principal Investigator:**

**Date:** 23-May-07

## **Data Request to ACC.**

### *Effective occupational health interventions in agriculture: key characteristics of their development and implementation in New Zealand*

#### **Request 1: Data to identify the survey sample**

**Names:** Colin Cryer; Dave Barson

**Position:** Research Associate Professor; Data Manager

**Address:** Injury Prevention Research Unit (IPRU), Department of Preventive and Social Medicine, Dunedin School of Medicine, University of Otago, P O Box 913, Dunedin.

**Date:** 23 May 2007

**Date data required by:** (a) Early July / (b) Early October / (c) Early January / (d) Early April

#### **Case definition:**

Any claim that meets all of the following criteria for its respective data request date above:

1. Has an injury event date between
  - a. 1 Mar 2007 and 31 May 2007
  - b. 1 June 2007 and 31 August 2007
  - c. 1 September 2007 and 30 November 2007
  - d. 1 December 2007 and 31 February 2008
2. The ACC account is one of Employer, Self-Employed, Residual
3. If Residual account, then the at work indicator field is set to “Yes”
4. New claims only (as opposed to on-going)
5. wcdays>21 days

#### **Data required:**

We require a SAS (version 9) dataset where the dataset 1(a) contains one claim per row.

<b>Dataset 1(a): ACC Claims Dataset</b>
Case ID
Person ID
Claim Date
Date of Birth
Sex
Ethnicity
Accident Date
Fatality Indicator
Number of days on which earnings-related compensation is paid <sup>m</sup> (wcdays)
At Work Indicator
Account
Employment Status
Gradual Process Claim (Y/N)

<sup>m</sup> Could you please derive a variable that approximates this?



We require a SAS (version 9) dataset where the dataset 1(b) contains all diagnoses recorded for each claim (row in dataset 1(a)).

<b>Dataset 1(b): ACC Diagnosis Dataset</b>
Case ID
Injury Sequence Number
Primary Injury Indicator
Read ID
ICD-9 ID
ICD-10 ID
Read Code (original submitted code)
ICD-9 Code (original submitted code)
ICD-10 Code (original submitted code)
ACC Diagnose Code
Injury Site

**Request 2: Data to be used to survey selected injured farmers and farm workers.**

**Names:** Colin Cryer; Dave Barson

**Position:** Research Associate Professor; Data Manager

**Address:** Injury Prevention Research Unit (IPRU), Department of Preventive and Social Medicine, Dunedin School of Medicine, University of Otago, P O Box 913, Dunedin.

**Date:** 23 May 2007

***Date data required by:*** (a) Mid July / (b) Mid October / (c) Mid January / (d) Mid April

***Case definition:***

IPRU will select a stratified random sample of cases from dataset 1 and send person IDs and case IDs to ACC. These are the case identifiers for the second dataset.

***Data required:***

For each Person / Case ID:

- All name fields
- Current Postal address
- Current Residential Address
- Current TLA
- Current Telephone number.

## Appendix 3: Questionnaire

### 1. CURRENT OCCUPATIONAL DETAILS

#### 1. What is your relationship to the farm? Are you the:

1. Farm owner (Go to Question 2)
2. Owner/operator (Go to Question 2)
3. Sharemilker (if sole operator/manager Go to Question 2)
4. Employed farm manager (Go to Question 2)
5. Family member (Go to Question 14)
6. Farm worker (Go to Question 15)

### 2. FARM/FARMER CHARACTERISTICS (to be answered by farm owner and or owner operator, manager, sharemilker/manager)

*We would like to ask you some questions about the farm operation*

#### 2. What size is the property? (1 hectare is about 2.5 acres)

1. 0-99 hectares
2. 100-499 hectares
3. 500-999 hectares
4. 1000-2499 hectares
5. >2500 hectares
6. Life style block (1 hectare, 2 hectare ....)\_\_\_\_\_

#### 3. Is the predominant terrain:

1. High country
2. Hill country
3. Rolling country
4. Plains
5. Other (specify)\_\_\_\_\_

#### 4. Which of the following features does the farm have?

1. Dams/ponds
2. wells
3. wool sheds
4. workshop
5. chemical storage area
6. stables
7. rivers/streams
8. haysheds
9. silo

10. implement shed
11. garage/vehicle storage area
12. forest plantation/block
13. high voltage overhead power lines
14. silage pit
15. offal pit
16. milking shed
17. fixed irrigation
18. stock yards
19. sheep dip
20. other? \_\_\_\_\_

**5. Number of people normally resident on the farm**

- |          |    |       |  |
|----------|----|-------|--|
| Adults   | 1. | 16+   |  |
| Children | 2. | 0-4   | <b><u>If children Go to Question 106</u></b> |
|          | 3. | 5-12  |  |
|          | 4. | 13-16 |  |

**6. Do you employ any workers?**

Yes (Go to Question 7)

No (Go to Question 13)

**7. How long have they worked for you? (Include separate answers for each employee)**

- 1. Less than a month**
- 2. A month**
- 3. Several months**
- 4. Half a year**
- 5. One year**
- 6. More than a year \_\_\_\_\_**
- 7. Annually – for contracted period only**

**8. What is their employment status?**

1. Unlimited permanent contract
2. Fixed term contract
3. Temporary employment agency contract
4. Apprenticeship/cadetship or other training scheme
5. On call/casual contract
6. Subcontract
7. Other

**9. Do you employ any workers from overseas?**

1. Yes (country of origin? \_\_\_\_\_) (Go to Question 10)
2. No (Go to Question 11)

**10. What is their employment status?**

1. Fixed term contract
2. Temporary employment agency contract
3. Apprenticeship/cadetship or other training scheme
4. On call/casual contract
5. Subcontract
6. Other

**11. How long have they worked for you? (Include separate answers for each employee)**

- 1. Less than a month**
- 2. A month**
- 3. Several months**
- 4. Half a year**
- 5. One year**
- 6. More than a year \_\_\_\_\_**
- 7. Annually – for contracted period only**

**12. Do your workers live**

- 1. On the farm**
- 2. Off the farm**
- 3. Some on the farm, some off the farm**

**13. What are the major sources of income for this enterprise? (Answer all that apply?)**

1. poultry (meat)
2. poultry (eggs)
3. grapes
4. plantation (fruit)
5. orchard and other fruit
6. potatoes
7. other vegetables
8. cereal grains (wheat, oats etc)
9. sheep (wool)
10. sheep (meat)
11. cattle (meat)
12. cattle (milk)
13. pigs
14. sheep shearing services
15. other services to agriculture
16. other \_\_\_\_\_

**14. What business type is this enterprise?**

1. Individual ownership
2. Partnership
3. Maori incorporation
4. Registered company
5. Maori Trust

- 6. Family Trust
- 7. Other please specify: \_\_\_\_\_

**(Go to Question 16)**

**15. Do you work on the farm?**

- 1. Yes (Go to question 16)
- 2. No (Go to Question 186) ask – What is your relationship to the farm owner/operator (eg. Partner, wife, friend, cousin etc) \_\_\_\_\_

**16. How many years have you been farming?**

- 1. Under 1 year (go to 17)
- 2. 1-4 years (go to Q17)
- 3. 5-9 years (go to Q 19)
- 4. 10-20 years (go to Q 19)
- 5. over 20 years (go to Q 19)

**17. Have you had any previous work experience in the agricultural sector?**

- 1. Yes (go to Question 18)
- 2. No (go to Question 19)

**18. What did this experience involve?**

**19. What do you consider to be your primary occupation?**

**20. In that occupation what tasks or duties do you spend the most time on?**

\_\_\_\_\_

**21. Do you have more than one paying job? (prompt: including part time evening and weekend work)**

- 1. Yes (go to Question 22)
- 2. No (go to Question 29)

**22. What is the main activity of the place in which you work your second job?**

\_\_\_\_\_

**23. Is your second job**

- 1. Temporary (Go to Question 24)
- 2. Permanent (Go to Question 25)

**24. How long will your period of employment be for this second job?**

**25. Do you have an employment contract?**

1. Yes (Go to Question 26)
2. No (Go to Question 29)

**26. Is your employment contract an individual or collective contract?**

1. Individual
2. Collective
3. Other

**27. Which of the following describes your current employment contract?**

1. Unlimited permanent contract
2. Fixed term contract (Go to Question 28)
3. Temporary employment agency contract (Go to Question 28)
4. Apprenticeship/cadetship or other training scheme (Go to Q 28)
5. On call/casual contract (Go to Question 28)
6. Subcontract (Go to Question 29)
7. Other \_\_\_\_\_

**28. Do you expect your employment contract to be renewed when it finishes?**

**29. Are you a member of an organization that represents the interests of farmers and farm workers? (for example Federated Farmers)**

1. Yes  
Name of organization \_\_\_\_\_

2. No

**30. Assuming that your top working capacity would score 10 points, while your total inability to work would score 0, how many points would you give your working capacity at the moment?**

0    1    2    3    4    5    6    7    8    9    10

**OUTCOMES (WORK RELATED INJURIES AND ILLNESSES)**

**OCCUPATIONAL DISEASE**

*I would now like to ask you some questions about illnesses you have had..*

**31. In the last twelve months have you suffered any of the following illnesses/diseases?**

<b>Illness/Disease</b>	<b>1. Yes 2. No</b>
1.Chronic/Acute chemical poisoning	<b>(consulted with Hilda)</b>
<b>Disease</b>	
2. Leptospirosis	
3. Cancer (incl melanoma)	
4. High Blood Pressure	
5. Heart attack/stroke	
6. Hepatitis/jaundice	
7. Epilepsy/blackouts	
8. Diabetes	
9. Tuberculosis	
10. Gout/arthritis	
11. Bronchitis/pneumonia	
12. Mental illness/breakdown	

**32. Have you experienced any of the following conditions over the last twelve months?**

1. Yes 2. No

1. Chronic bronchitis	
2. Asthma and taking asthma medication	
3. Hay Fever	
4. Skin Cancer (excl melanoma)	
5. Melanoma	
5. Hearing loss (NIHL	
6. Eczema	
7. Cough that has lasted more than 3 days	
8. Other	
9. None	

**If answer no to each option in Qs 31 and 32, skip to 34.**

**33. Did you see a doctor, nurse or other health professional, as a result of any of these illnesses/diseases/conditions?**

- 1. Yes
- 2. No

**34. Can you tell me if you have experienced any of the following?**

1. Pain or discomfort in shoulders and neck

1. Yes

2. No

2. Pain or discomfort in upper limbs

1. Yes

2. No

3. Pain or discomfort in lower limbs

1. Yes

2. No

4. Backache

1. Yes

2. No

**If No to all of the above Go to Question 37**

**35. Did you see a doctor, nurse or other health professional, as a result of any of these musculoskeletal conditions?**

1. Yes

2. No

**36. Was a claim made to ACC as a result of any of these illnesses/diseases, muscular skeletal conditions?**

1. Yes

2. No

3. Don't know

**37. Do you smoke one or more tobacco cigarettes a day?**

1. Yes (Go to Question 38)

2. No (Go to Question 39)

**38. About how many cigarettes do you smoke in the average day?**

\_\_\_\_\_ (Go to Question 40)

**39. Have you ever been a regular smoker of one or more cigarettes per day?**

1. Yes

2. No



**40. Have you had a drink containing alcohol in the last year?**

1. Yes (go to Question 41)
2. No (go to Question 43)

**41. In the last year how often did you have a drink containing alcohol?**

1. Monthly
2. Up to 4 times a month
3. Up to 3 times a month
4. 4 or more times a week

**42. How many drinks containing alcohol do you have on a typical day when you are drinking?**

1. One or two
2. Three or four
3. Five or six
4. Seven to nine
5. Ten or more

**OCCUPATIONAL INJURY**

*I would now like to ask you some questions about injuries that you might have experienced in the last 3 months.*

*We are interested in injuries on the farm.*

- *This includes any injuries suffered by anyone working (paid or unpaid) on, visiting or living on the property, including children.*
- *Excluded are injuries relating to homemaking activities (eg. washing / cleaning in own home; mowing the lawn) or DIY activities on the family home.*

[Note: the following are based on work from the US following an international review of survey questions.]

**43. 1. During the past 3 month, that is since (say 3 months prior to interview time) ##, did you have an injury on this farm where any part of your body was hurt, for example with a broken bone, dislocation, sprain, burn, cut, bruise, or animal or insect bite? Only include injuries which restricted activities for a half day or more -or which required advice or treatment from a health professional.**

1. Yes
2. No (Go to Question 58)

2. During the last 3 months, how many times were you injured on this farm? (**Only include injuries which restricted activities for a half day or more -or which required advice or treatment from a health professional.**)

3. How many of these injuries restricted your activity for half a day or more?

4. For how many did you talk to a health professional about these injuries?

*If AgriBase sampled: Thinking about your last injury on this property*

*If ACC sampled: Thinking about the injury that resulted in ACC earnings related compensation for several weeks:*

**44. was the injury work-related? (By work I mean any activity – paid or unpaid – that contributes to the economic viability of the farm. This excludes domestic activities (e.g. washing clothes, cleaning the house, cutting the lawn), and DIY activities on your living quarters.)**

**1. Yes (Go to Question 45)**

**2. No (Go to Question 58)**

**45. What was the nature of the injury?**

<b>Injury</b>	<b>1. YES 2. NO</b>
1. Cut	
2. Sprain or strain	
3. Dislocation	
4. Crushing injury	
5. Amputation	
6. Eye Injury	
7. Fracture or broken bone	
8. Burn	
9. Bruise	
10. Puncture	
11. Poisoning	
12. Loss of consciousness	

**46. What part of the body was injured? [Just record one of the following]**

1. Multiple sites
2. Eyes
3. Head
4. Neck
5. Shoulder / upper arm
6. Elbow / lower arm
7. Wrist, hand
8. Hip,
9. Thigh
10. Knee, lower leg
11. Ankle, foot

12. Upper back or upper spine
13. Lower back or lower spine
14. Chest (excluding back and spine)
15. Abdomen or pelvis (excluding back and spine)
- If it is internal
16. Chest (within ribcage)
17. Abdomen or pelvis (below ribs)
18. Other – specify \_\_\_\_\_

**47. Can you please describe the incident that lead to the injury?**

Please describe what happened:

\_\_\_\_\_

Time of Day \_\_\_\_\_ Season \_\_\_\_\_

Terrain \_\_\_\_\_

**48. Code from description or prompt: What were you doing immediately before the injury <<insert ACC Activity codes – see Ari>> (Will have on Monday and will insert)**

**49. Code from description or prompt: What caused the injury?**

1. Transportation-related
2. Bumped, pushed, bitten etc. by person or animal
3. Struck or crushed by object
4. Contact with sharp object, tool or machine.
5. Smoke, fire, flames,
6. Contact with hot object, liquid or gas
7. Extreme weather or natural disaster
8. Overexertion or strenuous movement
9. Physical assault
10. Fall
11. Other

**50. Code from description or prompt: What vehicles, machinery, tools or animals were involved?**

1. Tractor
2. Bulldozer
3. Truck / Utility vehicle
4. 2-wheeled motorcycle
5. ATV (3 or 4 wheeled)
6. Other motor vehicle
7. Trailer
8. Other trailed machinery
9. Other agricultural machinery
10. Chainsaw
11. Hand-held power tools

- 12. Horse
- 13. Cattle
- 14. Sheep
- 15. Other animal
- 16. Firearm
- 17. Water
- 18. Electricity
- 19. Chemicals (acute poisoning)

**51. Did the injury restrict your normal activities for half a day or more?**

- 1. Yes
- 2. No

**52. Did the injury result in any of the following actions (record all that apply):**

- 1. Consulting a community nurse
- 2. Consulting a family doctor (outside of hospital)
- 3. Consulting a specialist doctor (outside of hospital)
- 4. Hospital casualty
- 5. Admitted to hospital bed
- 6. Other health professional

**53. Did you make a claim to the ACC for this injury, or did someone make a claim on your behalf?**

- 1. Yes
- 2. No
- 3. Don't Know

**54. Did the injury result in you not being able to work at the same pace or with the same ease as usual, for five days or more?**

- 1. Yes
- 2. No

**55. On a scale of 1-10, where 10 represents your top working capacity and 1 represents no capacity; how would you score your working capacity during the worst period of your injury?**

0      1      2      3      4      5      6      7      8      9      10

**56. How long was it before you returned to normal farming duties? \_\_\_\_\_**

**57. What do you think the cause of this incident was?**

**58. Do you think the incident was preventable?**

1. Yes. How? \_\_\_\_\_

2. No. Why? \_\_\_\_\_

#### **4. WORK ENVIRONMENT (All participants who work on the farm)**

*We would now like to ask you some questions about your work environment.*

##### **Physiochemical hazards**

**Please tell me if you are exposed to any of the following and how frequently**

**59. Are you exposed to vibrations from hand tools?**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**60. Are you exposed to vibrations from vehicles?**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**61. Noise so loud that you have to raise your voice to talk to people?**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**62. High temperatures that make you perspire?**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**63. Low temperatures whether indoors or outdoors?**

1. Always
2. Often
3. Sometimes
4. Rarely

5. Never

**64. Breathing in vapors, fumes, dust, or dangerous substances such as chemicals, infectious materials etc.**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**65. Handling or touching dangerous products or substances such as pesticides, solvents or chemicals**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**66. Radiation – such as welding light**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**67. Are you exposed to cleaning agents, shampoos or disinfectants in contact with your skin**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**68. Are you exposed to dust from metals, stone, quartz, cement, asbestos, mineral wool or similar**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**69. Are you exposed to dust from textiles, wood, flour, animals, plants?**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**70. Are you exposed to gases or vapors from solvents, paints, pesticides or plastic chemicals**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

### **Ergonomic hazards**

*Does your main job involve?*

**71. Working in painful or tiring positions**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**72. Carrying or moving heavy loads**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**73. Repetitive hand or arm movements**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**74. Bending forward without supporting yourself with your hands or arms**

1. Always

2. Often
3. Sometimes
4. Rarely
5. Never

**75. Working in a twisted posture**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**76. Working with your hands raised to the level of your shoulders or higher**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**77. Working in a sitting position**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**78. Exerting yourself more than walking, standing and moving around in a normal way**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

**79. Do you wear any protective equipment while you work?**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never



**80. How informed would you say you were about the risks resulting from the use of materials, instruments or products which you handle in your work?**

1. Always
2. Often
3. Sometimes
4. Rarely
5. Never

## FARMING RELATED STRESS

*I am now going to read out some events and situations which represent a potential source of farming related stress. Can you please tell me your assessment of the level of stress caused by the event or situation to you using a scale of not applicable, none, moderately severe, very severe*

**81. Increased work load at peak times such as lambing, calving, harvesting etc.**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**82. Dealing with ACC**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**83. Bad weather**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**84. Complying with the health and safety in Employment Act**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**85. Filling in government forms**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**86. Too much work to do and too little time to do it**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**87. Worrying about commodity prices**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**88. Adjusting to new government regulations and policies**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**89. Unpredictability of weather**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**90. Machinery breakdown at busy times**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**91. Long hours of work**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**92. Few holidays away from the farm**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**93. Having a farm related accident**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**94. No farm help or lack of help when needed**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**95. Feeling isolated**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**96. Introduction of exotic diseases that will affect farming**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**97. Not having enough ready cash**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**98. Debt load**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**99. Worrying about the viability of the farm**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

**100. Worrying about owing money**

1. Not applicable
2. None
3. Moderately severe
4. Very Severe

Organisation of Work

**101. Do your hours of work vary by season?**

1. Yes (Go to Question 102)
2. No (Go to Question 104)

**102. How many hours per day would you work in:**

1. Autumn \_\_\_\_
2. Winter \_\_\_\_
3. Spring \_\_\_\_
4. Summer \_\_\_\_

**103. How many days per week would you work in:**

1. Autumn \_\_\_\_
2. Winter \_\_\_\_
3. Spring \_\_\_\_
4. Summer \_\_\_\_

**104. Do you commute to work?**

1. Yes (Go to Question 105)
2. No (Go to Question 106)

**105. If yes, how long does it take you to commute to work?**

\_\_\_\_\_

**CHILDREN**

*I am now going to ask you about children on the property.*

**106. Are there any children under 16 years of age living on the property (please include those who may board away from home during school term)**

- 1. Yes (go to Question 107)
- 2. No (Go to Question 115)

**107. Please indicate how many children there are in each of the following age groups and their sex**

Under 5 years	5-9 years	10-14 years
_____	_____	_____
m/f	m/f	m/f

**108. Have your children received farm safety lessons in the last 12 months?**

- 1. No
- 2. yes, in the classroom
- 3. yes, as part of an organized school tour to a working property
- 4. yes, as part of an organized tour by another group/organization to a working property

*If there are no children under five years go to Question 110)*

**109. Is there a place with a secure fence for young children to play?**

- 1. Yes
- 2. No

**110. Do the children (does the child) help with work around the farm? If yes, what do they typically do? - Please describe \_\_\_\_**

**111. How frequently do/does children/child under take the following activities**  
(for each child)

Age:  
Gender

Activity	N/A	Always	Sometimes	Rarely	Never
Rides bicycle on farm					
Operates 3-wheel ATV on farm					
Operates 4-wheel ATV on farm					
Rides on an ATV as a passenger					
Operates motorcycle on farm					
Rides horses without a helmet					
Has access to silos					

Use of firearms					
Swims in dam/pond					
Swims in river/stream/lake					
Operates a chain saw					
Mixes agricultural chemicals					
Has access to farm workshop					
Operates farm workshop machinery					
Has access to hayshed					
Operates tractors					
Rides on tractors as passenger					
Does not wear earmuffs near noisy machinery					
Does not wear safety boots around the farm					
Works with stock					
Plays near machinery					
Feeds animals					
Rides on trailers					
Does heavy lifting (eg haymaking)					
Accompanies others while they work on the farm					

**112. Do your children accompany you when you work on the farm?**

1. Almost never
2. Quite seldom
3. Quite often
4. Almost always

**113. If children accompany adults while they work on the farm, how are they transported?**

**114. Have you any suggestions on how injuries to children can be prevented on farms?**

## SELECTED WORKPLACE EXPOSURES

### CHEMICALS AND HAZARDOUS SUBSTANCES

*We would now like to ask you some questions about chemicals and other hazardous substances used on the farm*

**115. Which of the following types of chemicals do you use on your farm?**

1. Herbicides
2. Pesticides
3. Dips and drenches
4. Paints
5. Oil products
6. Fertilizers
7. Disinfectants
8. Other, specify: \_\_\_\_\_

**116. Do you think your health has been affected by chemicals of any sort that you have used on your farm in the last 12 months?**

1. Yes
2. No (Go to Question 123)

*Thinking back to the chemical you suspect has affected your health most seriously....*

**117. Please describe the type of chemical (e.g. Pesticide, herbicide etc) you think is responsible**

\_\_\_\_\_

**118. How do you think the chemical got into your body?**

1. By being breathed in
2. By being swallowed
3. Through the skin
4. Other, specify \_\_\_\_\_

**119. When using this chemical do you wear protective clothing to protect your...**

1. Face/head/neck
2. Upper trunk
3. Lower trunk
4. Arms/hands
5. Legs/feet
6. Lungs
7. Eyes
8. I don't wear protective clothing

**120. To what extent was your farming routine affected by contact with this chemical?**

1. My routine wasn't affected
2. I was unable to work normally for less than one week
3. I was unable to work normally for less than one week and one month
4. I was unable to work normally for over one month

**121. Did you ever receive medical treatment for the effects of contact with this chemical?**

1. Yes (Go to Question 122)
2. No (Go to Question 123)

**122. If Yes, who did you first consult for treatment?**

1. Nurse
2. General Practitioner
3. Emergency medical centre
4. Public hospital
5. Other, specify \_\_\_\_\_

**123. Where do you store chemicals on your farm?**

1. Main shed
2. Separate shed
3. Garage
4. Inside house
5. Other: specify \_\_\_\_\_

**124. Do you lock the areas where the chemicals are stored?**

1. Yes, all of them
2. Yes, some of them (why some and not others? \_\_\_\_\_)
3. No none of them (why is that? \_\_\_\_\_)

**125. When mixing/preparing chemicals/pesticides – (If never mix or prepare chemicals/pesticides Go to Question 126)**

1. Face mask/dust mask
2. Always
3. Sometimes
4. Never
5. Not provided
6. Don't Know



2. Respirator
  2. Always
  3. Sometimes
  4. Never
  5. Not provided
  6. Don't Know
  
3. Protective face shield
  2. Always
  3. Sometimes
  4. Never
  5. Not provided
  6. Don't Know
  
4. Coveralls/overalls
  2. Always
  3. Sometimes
  4. Never
  5. Not provided
  6. Don't Know
  
5. Gloves
  2. Always
  3. Sometimes
  4. Never
  5. Not provided
  6. Don't Know
  
6. Boots
  2. Always
  3. Sometimes
  4. Never
  5. Not provided
  6. Don't Know

## **VEHICLES / MACHINERY**

### **Technology/ownership/use**

**126. Which of the following items of machinery or equipment do you use on the farm?**

1. 2-wheel farm bike (see section re questions on motorcycles)
2. 3-wheel ATV – (see section re questions on ATV usage)
3. 4-wheel ATV –(see section re questions on ATV usage)
4. Milking equipment
5. Shearing equipment
6. Tractor (see tractor usage questions)
7. Implements pulled by tractor
8. Chainsaw (see chainsaw usage questions)
9. Harvester
10. Firearms
11. Workshop equipment
12. Farm forestry equipment
13. Irrigation equipment
14. Other (specify): \_\_\_\_\_

### **TRACTORS**

**127. How many operational tractors are located on your property? \_\_\_\_\_**

(If no operational tractors go to Question 135)

**128. How many hours per week would you use the tractor, on average? \_\_\_\_\_**

**129. Does this use vary by season?**

1. Yes
2. No

Number of hours: 

1. Autumn
2. Winter
3. Spring
4. Summer

**130. Have you ever been injured while using a tractor?**

Yes (specify injury) \_\_\_\_\_  
No

**131. Are there any other comments you would like to make about the tractors on your property?**

**132. For all tractors - do they have?**

1. Roll over protection structures (ROPS)
  1. All
  2. Some
  3. None
  4. Don't Know
  
2. Enclosed cabin
  1. All
  2. Some
  3. None
  4. Don't Know
  
3. Fitted with seatbelts
  1. All
  2. Some
  3. None
  4. Don't Know
  
4. Fitted with passenger seats
  1. All
  2. Some
  3. None
  4. Don't Know
  
5. Power take offs (PTOs)/stub shafts that are guarded
  1. All
  2. Some
  3. None
  4. Don't Know
  
6. Safety starters start with switch
  1. All
  2. Some
  3. None
  4. Don't Know

**133. When operating motor vehicles (other than tractors and ATVs) do you use:**

Seat belts

1. Always
2. Sometimes
3. Never
5. Not provided
6. Don't Know

**134. When operating tractors, how often do you**

1. (If no motor vehicles on this farm Go to Question 155)

(a) Park on level ground

1. Always
2. Often
3. Sometimes
4. Not Often
5. Never
6. Not relevant
7. Don't Know

(b) Carry passengers on a tractor without a passenger seat

1. Always
2. Often
3. Sometimes
4. Not Often
5. Never
6. Not relevant
7. Don't Know

(d) Get on or off a tractor while it is still moving

1. Always
2. Often
3. Sometimes
4. Not Often
5. Never
6. Not relevant
7. Don't Know

(e) Leave keys in the ignition when unattended

1. Always
2. Often
3. Sometimes
4. Not Often
5. Never

**2-WHEELED MOTORCYCLES**

**135. How many motorcycles (2-wheeled) \_\_\_\_\_  
are on your property?**

If none, go to Question 144

**136. Can you give the following technical details about the motorcycles on the property?**

- Make?
- Size (cc)
- Year of manufacture
- Year of purchase

**137. How frequently do you use your motorcycles on your property for the following activities?**

often                      sometimes                      never

- Recreation
- Transport
- Spraying
- Mustering
- Carrying
- Towing

**138. How often do you perform routine maintenance on your motorcycles?**

1. Once a week
2. 1-3 months
3. 4-6 months
4. 7-9 months
5. 10-12 months
6. More than 12 months
7. Don't know

**139. We would like to know about who rides motorcycles for work or recreation on your property.**

Age	No. who ride	No who have received training in riding	Type of Bike ridden (2,3,4)
Less than 10 years			
10-14 yrs			
15-19 yrs			
20-39 yrs			
40-64 yrs			
65-74yrs			
75 +			

**140. How many hours per day would you use a motorcycle on the farm on average?**

\_\_\_\_\_

**141. How many days per week would you use a motorcycle on the farm on average?**

**142. Are there significant seasonal variations in the use of motorcycles?**

1. Yes
2. No

If Yes: seasonal variations in use (hours/day)

1. Spring
2. Summer
3. Autumn
4. Winter

**143. When riding a motorcycle, do you use**

2. Helmet
  2. Always
  3. Sometimes
  4. Never
  5. Not provided
  6. Don't Know

3. Boots
  2. Always
  3. Sometimes
  4. Never
  5. Not provided
  6. Don't Know

**ATVS (3- OR 4-WHEELED)**

**144. How many ATV's (3, or 4 wheel) \_\_\_\_\_  
are on your property?**

If none, go to Question 155

**145. Can you give the following technical details about the motorcycles/ATVs on the property?**

Make?

Size (cc)

Year of manufacture

3, 4, wheeler

Year of purchase

**146. How frequently do you use your ATV's on your property for the following activities?**

1. Recreation
  1. Often
  2. Sometimes
  3. Never
2. Transport
  1. Often
  2. Sometimes
  3. Never
3. Spraying
  1. Often
  2. Sometimes
  3. Never
4. Mustering
  1. Often
  2. Sometimes
  3. Never
5. Carrying
  1. Often
  2. Sometimes
  3. Never
6. Towing
  1. Often
  2. Sometimes
  3. Never

**147. How often do you perform routine maintenance on your ATV?**

1. Once a week
2. 1-3 months
3. 4-6 months
4. 7-9 months
5. 10-12 months
6. More than 12 months
7. Don't know

**148. We would like to know about who rides ATVs for work or recreation on your property.**

Age	No. who ride	No who have received training in riding	Type of Bike ridden (2,3,4)
Less than 10 years			
10-14 yrs			
15-19 yrs			
20-39 yrs			
40-64 yrs			
65-74yrs			
75 +			

**149. How many hours per day would you use an ATV, on average? \_\_\_\_\_**

**150. How many days per week would you use an ATV, on average?**

**151. Are there significant seasonal variations in the use of ATV's?**

1. Yes
2. No

If Yes: seasonal variations in use (hours/day)

1. Spring
2. Summer
3. Autumn
4. Winter

**152. For all ATV's, do you**

1. Have "No Go" areas marked on farm plan
  1. All
  2. Some
  3. None
  4. Don't Know



2. Use attachments designed for the vehicle and carry no more than specified loads?

1. All
2. Some
3. None
5. Don't Know

**153. When riding ATVs, do you use**

2. Helmet

1. Always
2. Sometimes
3. Never
4. Not provided
5. Don't Know

3. Boots

1. Always
2. Sometimes
3. Never
4. Not provided
5. Don't Know

2. Seat belts

1. Always
2. Sometimes
3. Never
4. Not provided
5. Don't Know

**154. When operating ATVs, how often do you**

1. Park on level ground

1. Always
2. Often
3. Sometimes
4. Not Often
5. Never
6. Not relevant
7. Don't Know

2. Carry passengers on an ATV

1. Always
2. Often
3. Sometimes
4. Not Often
5. Never
6. Not relevant
7. Don't Know

3. Get on or off an ATV while it is still moving

1. Always
2. Often
3. Sometimes
4. Not Often
5. Never
6. Not relevant
7. Don't Know

4. Leave keys in the ignition when unattended

1. Always
2. Often
3. Sometimes
4. Not Often
5. Never

## **HORSES**

**155. When riding horses, do you use a**

1. Don't ride horses (Go to Question 156)

2. Helmet
  2. Always
  3. Sometimes
  4. Never
  5. Not provided
  6. Don't Know

## **STOCK**

**156. For All Stock (if no Stock go to Question 157), do you have**

1. Escape opening for workers in stock yards/animal pens

1. All
2. Some
3. None
4. Don't Know

2. Head crushers for controlling stock

1. All
2. Some
3. None
4. Don't Know

3. Handrails

1. All
2. Some

3. None
4. Don't Know

## **CHAINSAWS**

### **157. Do you use chainsaws on the property?**

1. Yes (if yes Go to Question 158)
2. No (if no go to Question 162)

### **158. How many hours per week would you use a chainsaw, on average?**

### **159. How many days per week would you use a chainsaw, on average?**

### **160. Does this use vary by season?**

1. Yes
2. No

- Number of hours:
1. Autumn
  2. Winter
  3. Spring
  4. Summer

### **161. When operating a chainsaw, do you use**

1. Don't operate a chainsaw (Go to Question 200)

2. Safety goggles/glasses/visor

1. Always
2. Sometimes
3. Never
4. Not provided
5. Don't Know

3. Gloves or chainsaw mitt

1. Always
2. Sometimes
3. Never
4. Not provided
5. Don't Know

4. Chaps

1. Always
2. Sometimes
3. Never
4. Not provided
5. Don't Know

5. Boots
  1. Always
  2. Sometimes
  3. Never
  4. Not provided
  5. Don't Know
6. Helmet
  1. Always
  2. Sometimes
  3. Never
  4. Not provided
  5. Don't Know
7. Earmuffs
  1. Always
  2. Sometimes
  3. Never
  4. Not provided
  5. Don't Know

## DAIRY SHEDS

### **162. For all dairy sheds – If no dairy sheds Go to Question 163) – do you have**

1. Safety guards on all moving parts (e.g. Belts and rotaries)
  1. All
  2. Some
  3. None
  4. Don't Know
2. Non-slip flooring in place
  1. All
  2. Some
  3. None
  4. Don't Know
3. Tripping hazards (e.g. Hoses, cables, spray cans) removed?
  2. All
  3. Some
  4. None
  5. Don't Know
4. Residual current device (RCD) on electrical switchboard?
  2. All
  3. Some
  4. None
  5. Don't Know

## WORKSHOPS

### **163. For all workshop equipment are there: (If no workshop Go to Question 165)**

Safety guards on saws, planes, routers, grinders, augers and cutting blades?

1. All
2. Some
3. None
4. Don't Know

*We would like to know about protective equipment on the farm and how often you use it when performing these activities?*

### **164. How often do you use the following protective equipment for Workshop activities? (If no workshops go to Question 194)**

1. Earmuffs/plugs
  1. Always
  2. Sometimes
  3. Never
  4. Not provided
  6. Don't Know
2. Safety goggles
  1. Always
  2. Sometimes
  3. Never
  4. Not provided
  5. Don't Know
3. Heavy duty gloves
  1. Always
  2. Sometimes
  3. Never
  4. Not provided
  5. Don't Know
4. Boots
  1. Always
  2. Sometimes
  3. Never
  4. Not provided
  5. Don't Know
5. Isolating transformer or residual current device
  1. Always
  2. Sometimes
  3. Never
  4. Not provided
  5. Don't Know

## **OTHER WORK PRACTICES**

**165. When using electrical equipment outdoors do you use an isolating transformer or residual current device?**

2. Always
3. Sometimes
4. Never
5. Not provided
6. Don't Know

**166. How often do you work alone?**

1. Always
2. Often
3. Sometimes
4. Not Often
5. Never

**167. Do you carry a cell phone with you?**

1. Always
2. Often
3. Sometimes
4. Not Often
5. Never

**168. Do you adjust machinery while it is still running (including making adjustments from a running vehicle, such as a tractor)?**

1. Always
2. Often
3. Sometimes
4. Not Often
5. Never

*We would now like to ask you some questions about work safety. Please be aware that the questions asked on work practices and safety equipment usage are not meant to identify good or bad farmers, they are there simply to help us understand what occurs in the farm workplace.*

**169. It would help me to work more safely if:**

**1. I was praised for safe behaviour**

1. Strongly Agree
2. Agree
3. Neither agree or disagree
4. Disagree
5. Strongly Disagree

**2. Safety procedures were more realistic**

1. Strongly Agree
2. Agree
3. Neither agree or disagree
4. Disagree
5. Strongly Disagree

**3. My recommendations were listened to and acted on**

1. Strongly Agree
2. Agree
3. Neither agree or disagree
4. Disagree
5. Strongly Disagree

**4. We had safety training more often**

1. Strongly Agree
2. Agree
3. Neither agree or disagree
4. Disagree
5. Strongly Disagree

**5. The proper equipment was provided more often**

1. Strongly Agree
2. Agree
3. Neither agree or disagree

4. Disagree
5. Strongly Disagree

**6. Workplace safety checks were carried out more often**

1. Strongly Agree
2. Agree
3. Neither agree or disagree
4. Disagree
5. Strongly Disagree

**7. My workmates supported safe behaviour**

1. Strongly Agree
2. Agree
3. Neither agree or disagree
4. Disagree
5. Strongly Disagree

**8. I was rewarded (less levies / paid more) for safe behaviour**

1. Strongly Agree
2. Agree
3. Neither agree or disagree
4. Disagree
5. Strongly Disagree

**And : When I worked unsafely, it was because:**

**9. I was not trained properly**

1. Strongly Agree
2. Agree
3. Neither agree or disagree
4. Disagree
5. Strongly Disagree

**10. I didn't know what I was doing wrong at the time**

1. Strongly Agree
2. Agree
3. Neither agree or disagree
4. Disagree
5. Strongly Disagree



**11. I needed to complete the task quickly**

1. Strongly Agree
2. Agree
3. Neither agree or disagree
4. Disagree
5. Strongly Disagree

**12. The right equipment was not provided or wasn't working**

1. Strongly Agree
2. Agree
3. Neither agree or disagree
4. Disagree
5. Strongly Disagree

**Positive Safety Practice**

**13. Our farm has enough safety equipment**

1. Strongly Disagree
2. Disagree
3. Neither Agree nor Disagree
4. Agree
5. Strongly Agree

**14. Our farm checks equipment to make sure it is free of faults**

1. Strongly Disagree
2. Disagree
3. Neither Agree nor Disagree
4. Agree
5. Strongly Agree

**15. There is adequate safety training on our farm**

1. Strongly Disagree
2. Disagree
3. Neither Agree nor Disagree
4. Agree
5. Strongly Agree

**16. Our farm is concerned with people's safety as it is with profits**

1. Strongly Disagree
2. Disagree
3. Neither Agree nor Disagree
4. Agree
5. Strongly Agree

**17. Everybody works safely on our farm**

1. Strongly Disagree
2. Disagree
3. Neither Agree nor Disagree
4. Agree
5. Strongly Agree

**18. All the safety rules and procedures on our farm really work**

1. Strongly Disagree
2. Disagree
3. Neither Agree nor Disagree
4. Agree
5. Strongly Agree

*And:*

**19. Safety works until we are busy, then other things take priority**

1. Strongly Agree
2. Agree
3. Neither Agree nor disagree
4. Disagree
5. Strongly Disagree

**20. If I worried about safety all the time, I would not get the job done**

1. Strongly Agree
2. Agree
3. Neither Agree nor disagree
4. Disagree
5. Strongly Disagree

**21. I can't avoid taking risks in my job**

1. Strongly Agree
2. Agree
3. Neither Agree nor disagree
4. Disagree
5. Strongly Disagree

**22. I can't do anything to improve safety on my farm**

1. Strongly Agree
2. Agree
3. Neither Agree nor disagree

4. Disagree
5. Strongly Disagree

**23. Accidents will happen no matter what I do**

1. Strongly Agree
2. Agree
3. Neither Agree nor disagree
4. Disagree
5. Strongly Disagree

**24. Not all accidents are preventable, some people are just unlucky**

1. Strongly Agree
2. Agree
3. Neither Agree nor disagree
4. Disagree
5. Strongly Disagree

**TRAINING**

*We would now like to ask you some questions about training. Formal training includes training by a qualified instructor or attendance at an accredited course. Examples of informal training are: being taught by the boss or co-worker, or being taught by a parent.*

**170. In the last six months have you received any training in the use of?**

**1. Tractors**

2. Formal
3. Informal
4. Self Taught
5. Not applicable

**2. ATV's**

2. Formal
3. Informal
4. Self Taught
5. Not applicable

**3. Chainsaws**

2. Formal
3. Informal

- 4. Self Taught
- 5. Not applicable

**4. Chemicals**

- 2. Formal
- 3. Informal
- 4. Self Taught
- 5. Not applicable

**5. Harvesters**

- 2. Formal
- 3. Informal
- 4. Self Taught
- 5. Not applicable

**6. Firearms**

- 2. Formal
- 3. Informal
- 4. Self Taught
- 5. Not applicable

**7. Heavy Vehicles**

- 2. Formal
- 3. Informal
- 4. Self Taught
- 5. Not applicable

**8. Two wheeled motorbikes**

- 2. Formal
- 3. Informal
- 4. Self Taught
- 5. Not applicable

**9. Horses**

- 2. Formal
- 3. Informal
- 4. Self Taught
- 5. Not applicable

**10. Stock**

- 2. Formal
- 3. Informal
- 4. Self Taught
- 5. Not applicable

**11. Other: machinery/equipment**

2. Formal
3. Informal
4. Self Taught
5. Not applicable

Specify: \_\_\_\_\_

**171. Have you ever attended a Farm safe course?**

When?

**(NB any course prior to 2002 is not a Farmsafe course)**

**172. Was this Farmsafe course about:**

1. Awareness
2. Plans
3. Skills and if Skills
  1. ATVS
  2. Chainsaws
  3. Tractors
  4. Other

**173. Have you ever attended a course related to your work?**

**BARRIERS TO SAFETY**

**174. I am now going to read you a list of issues which may interfere with your ability to perform your farm work duties safely.**

1. Having to rush
  1. All the time
  2. Quite a bit
  3. Some
  4. A little
  5. Not at all
2. Being tired/fatigued
  1. All the time
  2. Quite a bit
  3. Some
  4. A little
  5. Not at all
3. Lack of equipment necessary to complete the work safely
  1. All the time
  2. Quite a bit
  3. Some

4. A little
5. Not at all

4. Pressure from neighbours, co-workers or farm management

1. All the time
2. Quite a bit
3. Some
4. A little
5. Not at all

5. Lack of interest in farm safety

1. All the time
2. Quite a bit
3. Some
4. A little
5. Not at all

6. Lack of knowledge regarding safe work practices

1. All the time
2. Quite a bit
3. Some
4. A little
5. Not at all

7. Farm does not have enough money to invest adequately in farm safety

1. All the time
2. Quite a bit
3. Some
4. A little
5. Not at all

8. Other: specify : \_\_\_\_\_

1. All the time
2. Quite a bit
3. Some
4. A little
5. Not at all

**SAFETY CHECKS**

**175. Has a formal safety check been made of the farm in the last six months?**

- 1. Yes → If yes, when was the most recent check:
  - If yes, who completed it:
    - 1. Self
    - 2. Owner/operator
    - 3. Farm worker
    - 4. Contracted safety consultant/company
    - 5. OSH
    - 6. Other (please specify):
- 2. No (Go to Question 178)
- 3. Don't remember (Go to Question 178)

**176. Was any kind of guide (such as Federated Farmers guide or similar) used during the safety check?**

- 1. Yes (specify) \_\_\_\_\_
- 2. No
- 3. Don't know

**177. Was any action taken as a result of the safety check?**

- 1. Yes → If yes, what action did that involve?
- 2. No
- 3. Not needed
- 4. Don't know

**BARRIERS TO AND PROMOTERS OF INTERVENTION**

**178. What would you say are the main barriers to safety/safe practices on your farm?**

**179. What would you say is the most practical source of information available on farm safety?**

**180. Is safety information easy to access?**

- 1. Yes
- 2. No (describe problems)

**181. Is the safety information easy to put into practice?**

1. Yes (probe – what information source)
2. No (explain why.)

**182. What would you say is the main motivation for safe practices on your farm?**

**183. What do you think the main sites and causes of injury would be on your farm?**

**184. What do you think the main sites and causes of disease / ill health would be on your farm?**

**185. What factors impact on your ability to manage safety on the farm?**

1. Costs (probe - specifics)
2. Access to reliable safety equipment
3. Lack of time
4. Access to practical information
5. Other: (specify) \_\_\_\_\_

**DEMOGRAPHIC**

*Finally, we need to ask you some questions that will help us understand the population that we have surveyed.*

**186. What is your date of birth**

- 187.**
1. Male
  2. Female

**188. Marital Status: Which best describes your situation:**

1. I have never been legally married and I have never been legally joined in a civil union.
2. I am divorced or my marriage has been dissolved
3. I am a widow / widower /bereaved civil union partner
4. I am permanently separated from my legal husband / wife / civil union partner
5. I am legally married
6. I am legally joined in a civil union



**189. What is your highest educational qualification?**

**190. Which ethnic group do you belong to? (Please respond with each option that applies)**

1. New Zealand European
2. Māori
3. Samoan
4. Cook Island Maori
5. Tongan
6. Niuean
7. Chinese
8. Indian
9. Other such as *DUTCH, JAPANESE, TOKELAUAN*. Please state:

**191. Are you descended from a Māori (that is, did you have a Māori birth parent, grandparent or great-grandparent, etc)?**

1. Yes (Go to Question 192)
2. No (Go to Question 193)
3. Don't know (Go to Question 193)

**192. Do you know the name(s) of your iwi (tribe or tribes)?**

Yes. (Name of Iwi and home area or region of your Iwi)

**193. Are there any other comments you would like to make?**

**194. Would you be willing to participate in a follow-up face to face interview?**

If yes: confirm address details and telephone number

***Thank you for your participation in this telephone survey, your participation is appreciated.***