AGRICULTURAL SAFETY IN NEWFOUNDLAND AND LABRADOR

SUMMARY REPORT

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CONTENTS

KEY FINDINGS

This report presents results from the first study of agricultural safety in Newfoundland and Labrador (NL). That study had 5 main components including:

1) a review of the literature on agricultural safety contextualized for the NL industry;
2) a review of the literature on tractor safety and Rollover Protection Systems (ROPS);
3) a survey of NL agricultural operators;
4) a comparative analysis of the 2011 Canadian Census of Agriculture data for NL, Canada and by province; and
5) recruitment and knowledge mobilization support for a national initiative by the Prairie Agricultural Machinery Institute to design an affordable, operator-built ROPS for older tractors.

The agricultural sector in NL is somewhat different from agriculture in the rest of Canada in terms of the number and size of farms and commodity mix. Within Canada and globally, research has identified agriculture as one of the most hazardous sectors with some of the highest reported death and injury rates across sectors.

Literature Reviews

A review of research on agricultural safety contextualized for the NL industry identified the following as major hazards associated with the industry in other contexts:

a) machinery including tractors;
b) slips, trips, falls, and falls from height;
c) repetitive motion, excessive force, holding postures for prolonged periods (i.e. bending);
d) unsafe noise levels;
e) working with live animals;
f) sitting, standing and exposure to vibrations;
g) chemical exposures;
h) exposures to organic dusts, animals; and
i) work-related stress.

Literature review findings showed there is a relatively large amount of research on health and safety in dairy farming but very limited research, particularly in English, on health and safety on fruit operations and in fur farming - two important NL commodity groups.

A review of the literature on prevalence, risks and barriers to adoption of ROPS (Butler, Vincent, Neis, Hagel and Sorensen 2015) found that tractor rollovers have been the primary cause of work-related fatalities in agriculture in many industrialized countries. For instance, in the United States (USA) nearly a third of all work-related farming deaths in an 18-year period had farm tractors as the primary reason for the fatality (Biddle & Keane, 2012). Research has also shown that ROPS, when paired with seatbelts, are the most effective source of protection in the event of an overturn (Sorensen et al., 2008).

Survey of NL Agricultural Operators

The results of the review of agricultural safety research and of a second review of tractor-related hazards and the effectiveness of ROPS were used to design a questionnaire.

Thirty-seven face-to-face, confidential interviews, covering 42 distinct agricultural operations, were conducted with NL agricultural operators between March 2015 and April 2016. Operations included in the sample produced meat, dairy, vegetables, fruit and berries, horticulture, fur, and mixed commodities. They ranged in size from half an acre to over 500 acres, with a median size of 60 acres.

Occupational hazards, injuries and illnesses

- “Bending, lifting, twisting, and/or repetitive motion” was the most frequently identified hazard present on participant operations (94.6%) followed by slips/trips/falls (89.2%) and chainsaws (89.2%).
- Commonly identified hazards varied somewhat by commodity group.
- 62% of participants indicated that at least one of the selected hazards had been the source of an accident, injury, or illness on their operation.
- The hazards operators most frequently reported as having ever been the source of an accident, injury, or illness were ‘bending lifting, twisting, and/or repetitive motion’ (43.2%), followed by slips/trips/falls (35.1%), animals (24.3%), and heat/cold/wind exposure (18.9%).

Legislation and compensation

- Of 31 operations with employees, 25 (80.6%) had workers' compensation coverage for those employees while 6 (19.4%) did not. All incorporated farms with employees had coverage for the employees but only 68.7% of these had coverage for the owner/operator as well. None of the 11 operations with no employees had coverage for the owner/operator.
- 40.5% of the operations in our sample did not have WorkplaceNL coverage. This may partly explain why participants' responses indicated that only 25% of work-related accidents, injuries, and illnesses identified in our study had been reported to WorkplaceNL.
- Study participants had mixed feelings about the workers' compensation system with some stating that it is necessary, others suggesting that it is too expensive, and still others having no knowledge of the system whatsoever.
- Some operators have volunteers or unpaid family and friends who work on their operations. Unpaid workers are not covered by workers' compensation insurance (WorkplaceNL only insures paid employees).

Tractor safety, rollover protection structures (ROPS), and seatbelt use

- ROPS, when paired with seatbelts, are widely recognized as being the most effective source of protection in the event of an overturn. Used together, a ROPS and a seatbelt are 99% effective.
- Most (88.7%) of the tractors/machines in our dataset were reported to be equipped with ROPS, 77.1% were equipped with seatbelts, and 83.3% were equipped with power take-off (PTO) shields. These percentages are higher than in many other jurisdictions and may reflect the fact that NL tractors are generally newer than those on farms elsewhere.
- Participants most commonly reported rollovers/tipping and PTOs as the main hazards associated with working on tractors (73% of participants for each hazard).
- More than half of participants (56.8%) reported that they or someone else on their farm/operation had experienced a tractor-related close call.

- Only 8 (27.6%) of the 29 owners of seatbelt-equipped tractors reported that they consistently wear their seatbelt, while 18 (62.1%) reported that they do not wear it, and 3 (10.3%) reported that it depends on the situation.

Employees and agricultural safety training

- Slightly less than half (48.6%) of our 37 participants reported having some type of formal agricultural safety training, while 13 (35.1%) reported having transferrable safety training from another job or source outside of their agricultural work; 16.2% reported having no formal training at all.
- Of the 27 operators with employees, only 10 (37%) reported that their employees had at least one of the following: basic first aid, pesticide application, WHMIS, or CPR.

Operators' agricultural safety issues and priorities

- Participants identified machinery and equipment, chemicals/pesticides, musculoskeletal injuries, and awareness/training as the top four agricultural safety priorities for NL.
- Both large and small operators indicated a lack of training resources as a critical health and safety issue. Close to 30% of operators indicated they would like to have access to more training resources.

General Conclusions and Suggestions for Future Action

The primary objectives of this research were to document some of the main agricultural safety hazards in this province and to develop a plan for knowledge mobilization taking the priorities of local operators into account.

The small size of the NL agricultural sector, its diversity, and its widespread dispersal pose challenges for addressing the multiple OHS hazards and some of the operator priorities identified through the research including training, injury prevention, and prevention of occupational disease. There are also some potential challenges associated with making regulatory and workers' compensation systems work effectively for them. Regardless, failure to address these challenges could threaten the future sustainability of the food system because sustainable food systems require a vision that incorporates

attention to human resources and measures to protect the health of farm families and agricultural workers (Barnetson, 2009).

Promoting agricultural safety in NL requires developing a long-term strategy to address the hazards, issues, and priorities identified in this study. Related to this, we note the following:

1) The OHS experiences of NL agricultural operators are somewhat similar to those in other Canadian provinces and in other countries, but they are not entirely the same. Existing agricultural safety resources developed in other places should be adapted and transferred to the geographical context and commodity types of operations in NL.

2) Protection of the health of operators and employees in some of the main types of commodity production in NL agriculture including fur farming requires OHS research that is unlikely to be undertaken in other parts of the country.

3) In both large and small operations, participants indicated lack of training resources as a critical health and safety issue.

4) Interview results point to the economic fragility of some operations and to challenges around labour shortages as reflected in the age of farmers and reliance on volunteers on some operations.

5) Some participants were not aware of the OHS-related regulations and legislation that apply to the industry**.** To address this, government, commodity groups, and the NL Federation of Agriculture could work in closer cooperation to understand and communicate information about the regulations more effectively.

6) Lack of involvement with the compensation system may be limiting some operators' access to information on prevention and opportunities to reduce their compensation costs. A dedicated agricultural safety person at WorkplaceNL who could work with the sector on issues of prevention and on understanding the workers' compensation system more generally could be an important asset to the sector and the province.

7) Establishing a safety sector association for agriculture for the province would be one way to ensure research, knowledge transfer, training and development of prevention initiatives happen on an ongoing basis.

8) The absence of a strong national initiative around agricultural safety may be contributing to risk in the sector. Provincial leaders in government, industry, and WorkplaceNL should consider encouraging the federal government to re-invest in agricultural injury surveillance and in injury and illness prevention.

9) Temporary foreign workers and international and local volunteers are groups that play a crucial and growing role in agricultural operations in other parts of Canada. Temporary foreign workers have been shown to be at elevated risk of injury, illness, and fatality elsewhere. Careful monitoring of trends in hiring of foreign workers and the use of volunteers including knowledge of the places where they are employed in NL could help government develop targeted initiatives to try to protect their health and safety.

INTRODUCTION

Agriculture is considered to be one of the most dangerous types of work in Canada and globally (Donham & Thu, 1995; ILO, 2011). Work-related injuries, illnesses, and fatalities in agriculture have the potential to impose heavy health and financial burdens on operators, their employees and affected families. They can also affect larger economies. For instance, research has shown that farm-related preventable injuries cost the Canadian economy $373 million dollars and 184 lives in 2004 (SMARTRISK, 2009).

The agricultural sector in NL is a relatively small, widely dispersed sector that is somewhat different from agriculture in Canada as a whole. According to the 2011 *Census of Agriculture* (Statistics Canada, 2011), the NL industry is substantially different in character from the agricultural industry in other parts of Canada. For instance, it is significantly smaller both in terms of number and size of farms (see Table 1 below and Appendix A for a more detailed comparison of NL agriculture with the Canadian industry). NL agriculture also has a very different commodity profile from the rest of Canada with stronger emphasis on producing primarily fruit, vegetables, and horticultural commodities as opposed to meat and grain which are the backbone of the Canadian industry as a whole.

Table 1: Number and average size of farms, Canada and the provinces (Statistics Canada, 2011)

Region	Number of Farms	Average Farm Size
Canada	**205,730**	**778**
Newfoundland and Labrador	510	152
Prince Edward Island	1,495	398
Nova Scotia	3,905	261
New Brunswick	2,611	359
Quebec	29,437	280
Ontario	51,950	244
Manitoba	15,877	1,135
Saskatchewan	36,952	1,668
Alberta	43,234	1,168
British Columbia	19,759	327

This report summarizes findings from the first substantive program of research on health and safety in the NL agricultural sector. It includes a brief overview of findings from a literature review of agricultural safety research focused on the types of commodities produced in NL. We have also integrated into this summary information from a review of research on tractor rollovers, rollover protection structures (ROPS), and seatbelt use on tractors done for the larger study (see Appendix B).

The main part of the report provides a summary of results from a survey of agricultural operators in NL. Survey findings include information on the structure of the NL industry and the occupational hazards on NL farms identified by operators including those that have contributed to known accidents. The findings also include information about:

a) numbers and types of employees and volunteers on participating operations;
b) operator and employee safety training;
c) operators' knowledge of occupational health and safety regulations that apply to the sector;
d) workers compensation coverage and operators' reflections on workers compensation;
e) numbers of tractors, the presence of ROPS, and seatbelt use;
f) agricultural safety priorities identified by our study participants; and
g) suggestions for future actions.

AGRICULTURAL SAFETY LITERATURE REVIEW CONTEXTUALIZED FOR NL

Our review of existing research on agricultural safety encompassed the types of agriculture found in NL. The review found that agriculture is one of the most hazardous sectors in many countries with some of the highest reported death and injury rates across industries and sectors (Frank, McKnight, Kirkhorn, & Gunderson, 2004; Thu, 1998). In the USA, for instance, the 2001 fatality rate in agriculture was 21.3 per 100,000 workers, compared to an average industry rate of 3.9 per 100,000 in the same year in the U.S. (Frank et al., 2004, p. 230). In Canada, 1,975 people were killed in agricultural injury events during the period between 1990 and 2008 (Drul, 2011).

Existing research has identified a number of major hazards associated with agriculture.

1) **Machinery** is often identified as the leading cause of death in agriculture (Waggoner et al., 2011) predominantly from injuries associated with loading equipment, power take-off devices, augers, hay balers, tractors, and motor vehicles (as cited in McCurdy & Carroll, 2000, p. 472).

2) **Slips, trips, falls, and falls from height** are also common hazards for agricultural operators and workers. For instance, an American study found that up to a quarter of injury cases on farms were the result of falls (McCurdy & Carroll, 2000, p. 473).

3) **Working with live animals** is a type of hazard found on many agricultural operations **(**McCurdy & Carroll, 2000). An injury can occur during any of the many tasks involved in working with animals, ranging from moving them to vaccinating, feeding, caring for hooves, ear tagging, milking (in the case of cattle), and loading animals onto vehicles (Lindahl et al., 2013, p. 274).

4) **Repetitive motion, excessive force, holding postures for prolonged periods (i.e. bending), sitting, standing, and exposure to vibrations** from machinery and vehicles have all been associated with the development of **musculoskeletal disorders** among farmers and farm workers. Some of the more common types of musculoskeletal problems reported by farmers are chronic back pain, arthritis, sprains, and strains (Frank et al., 2004) as well as consequences of trauma such as sprains, fractures, and dislocations (Osborne et al., 2012a Osborne et al., 2012b).

5) Studies have shown that various types of activities on farms can expose agricultural workers to **unsafe noise levels** resulting in noise-induced hearing loss. Chainsaws, tractors without cabs, pig sheds at feeding times, sheep sheds during shearing (McBride, Firth, & Herbison, 2003, p. 1281), as well as grain dryers and brush hogs have all been implicated in high noise exposures (White & Cessna, 1989).

6) **Chemical exposures** associated with working with herbicides and pesticides can contribute to the increased risk of some occupational malignancies and cancers of the prostate, lip and eye among farmers and farmworkers (Runyan, 1993; White and Cessna, 1989; Waggoner et al., 2011; Frank et al., 2004).

7) There is an **elevated risk of occupational respiratory illnesses** among some agricultural workers. Both acute and chronic conditions have been associated with exposures to organic dusts and animals, as well as chemicals and other toxins (Frank et al., 2004, p.231; Hoppin et al., 2014).

8) **Farming is often considered to be a high stress occupation**, with many factors – such as climate, economics, and health – being regular stressors for farmers and farm workers. Research done elsewhere has found that farmers, farm workers, and farm family members all have high rates of stress-related mental disorders, particularly depression. Agricultural labourers and farmers have higher suicide rates than those of other occupational groups in some countries such as Australia.

Some groups are particularly at risk of injury within agriculture. These include **children** who are more likely to be employed for pay or as volunteers in agriculture than in other sectors and have a high work fatality rate (Sheldon & Field, 1995, p. 355). Another at-

risk group is **older farmers**. Farmers tend to work beyond the typical retirement age of workers and consistently engage in activities that require heavy physical labour, work from height, and/or interactions with large animals/livestock (Ibid). Many studies indicate that this group of farmers is an at-risk group, experiencing elevated numbers of deaths and illnesses. A third at-risk group that is common in agriculture is **migrant workers**. Poor English language skills, a lack of safety training or education, longer work hours, and sometimes payment based on piece work tend to put them at additional risk of injury and illness (McDuffie, 1995; Frank et al., 2004; McCurdy & Carroll, 2000).

The findings from our review of agricultural safety research from elsewhere indicated that certain types of agriculture found in NL, such as fur, berry, and organic farming, have been the focus of little research globally. Dairy farms, on the other hand, have been the focus of substantial research with many studies examining hazards and risks to farmers within this specific commodity group.

The next section presents the results from our survey of a sample of 37 agricultural operators in NL. These results indicate that the major hazards in NL agriculture are similar to those identified in research done elsewhere. These include machinery, bending, lifting and twisting, exposure to weather elements, and others. These hazards are also similar to those identified in a report from Service NL on farm inspections and from an analysis of WorkplaceNL compensation claims provided to the authors of this study and discussed elsewhere (Butler, Neis and Vincent 2015; Butler, Dabrowska, Neis, & Vincent, submitted).

SURVEY OF NL AGRICULTURAL OPERATORS

Participants and Participating Operations

Participation in the survey was free and voluntary. In total, **37 face-to-face confidential interviews** (covering 42 distinct agricultural operations) were conducted with consenting NL agricultural operators between March 2015 and April 2016. Participating operators were based on the Avalon Peninsula, in Central and Western NL, and in Labrador. They ranged in age from 29 to 77 years with an average age of 51.1 years. Six participants (16.2%) were women. *We did not interview agricultural employees in this survey.*

Operations included in the sample produced meat, dairy, vegetables, fruit and berries, horticulture, fur, and mixed commodities. They ranged in size from half an acre to over 500 acres, with a median size of 60 acres.

The number of employees on participating operations ranged from 0 to 39, with an average of 7.7 employees. The operations with the highest numbers of employees were dairy and fur farms while those with the lowest numbers produced meat, vegetables, and mixed commodities. On average, 33.8% of paid employees were full-time, 25.1% were part-time but year-round, and 41.1% were seasonal. Seven participants (18.9%) reported using volunteers or family and friends to help out on their farms; some indicated that they gave these volunteers free products in return for their help during harvest.

While 63% of operators with employees hired primarily from their local area, almost 30% had employees who came from other locations including other countries. This latter group included some workers brought into the province under the Canadian Temporary Foreign Worker Program.

Results

Occupational hazards, injuries, and illnesses

As part of the interview, participants were asked to "…indicate which of the following potential hazards are present on your farm/operation." Table 2 provides a summary of responses to a checklist of potential farm safety hazards that was presented to participants.

Of the hazards listed above**, 'bending, lifting, twisting, and/or repetitive motion was most frequently reported as being present on participants' operations**, with 35 (94.6%) of our 37 participants indicating "yes" in relation to this hazard. This was followed by slips/trips/falls (STFs) and chainsaws, each with 89.2% "yes" responses; other equipment, with 86.5%; and tractors, with 81.1%. Noise (78.4%) and weather conditions such as heat/cold/wind (75.7%) ranked 6th and 7th among identified hazards. The least commonly reported hazards were confined spaces and augers, with only 11 of 37 participants, or 29.73%, responding "yes" for each.

Table 2: Checklist of hazards with proportions of participants reporting their presence

Hazard	Proportion of "Yes" Responses	Hazard	Proportion of "Yes" Responses
Bending, lifting, twisting, and/or repetitive motion	35/37 (94.6%)	Crushing	26/37 (70.3%)
Slips, trips and falls (STFs)	33/37 (89.2%)	Working alone	25/37 (67.6%)
Chainsaws	33/37 (89.2%)	Chemical exposures	24/37 (64.9%)
Other equipment	32/37 (86.5%)	Allergen	20/37 (54.1%)
Tractors	30/37 (81.1%)	Animals	19/37 (51.4%)
Noise	29/37 (78.4%)	ATVs	19/37 (51.4%)
Heat, cold, or wind	28/37 (75.7%)	Electrical Hazards	15/37 (40.5%)
Power take-offs (PTOs)	26/37 (70.3%)	Drowning	14/37 (37.8%)
Dust	26/37 (70.3%)	Entrapment	14/37 (37.8%)
Fatigue	26/37 (70.3%)	Confined spaces	11/37 (29.7%)
Work-related stress	26/37 (70.3%)	Augers	11/37 (29.7%)

The most commonly identified hazards varied somewhat by commodity group (see Table 3).[1] For instance, the most commonly identified hazards on meat operations were tractors, chainsaws, and repetitive motion (all 7 of our participating meat producers responded "yes" for each). Dairy operators most frequently selected other equipment, weather elements, and noise (all 6 of our participating dairy producers responded "yes" for each). Vegetable producers most frequently reported chainsaws, other equipment, slips/trips/falls, and repetitive motion (responses from 9 of those 10 participants being "yes" for each), and horticultural operations most frequently reported tractors, chainsaws, other equipment, slips/trips/falls, repetitive motion, and crushing (responses from all 6 of those participants being "yes" for each).

[1] When separating our data into commodity groups, our individual units are operations, not participants. For this reason, data for participants with more than one operation (n = 5) are counted more than once.

Table 3: Top hazards identified by commodity groups, with percentages of "yes" responses from operators within those groups

Meat (n=7)	Dairy (n=6)	Vegetables (n=10)	Horticulture (n=4)	Berries (n=3)	Fur (n=3)	Mixed (n=9)
Tractors (100%)	Other Equipment (100%)	Chainsaws (90%)	Tractors (100%)	Tractors, PTOs, ATVs (100%)	Other Equipment (100%)	Chainsaws (100%)
Chainsaws (100%)	Weather Elements (100%)	Other Equipment (90%)	Chainsaws (100%)	Chainsaws (100%)	STFs (100%)	STFs (100%)
Repetitive Motion (100%)	Noise (100%)	STFs (90%)	Other Equipment (100%)	STFs (100%)	Repetitive Motion (100%)	Repetitive Motion (100%)
-	-	Rep. Motion (90%)	STFs (100%)	Rep. Motion (100%)	-	-
-	-	-	Rep. Motion (100%)	Chem.Haz. (100%)	-	-
-	-	-	Crushing (100%)	Noise (100%)	-	-
-	-	-	-	Crushing (100%)	-	-
-	-	-	-	Fatigue, Stress, Work Alone (100%)	-	-

Participating operators identified some hazards not contained in our original checklist. These included: "clothing and knowledge of what to wear" and the veterinary work involved in animal care, particularly working with needles and syringes.

When asked, "Have any of the listed hazards ever been the source of an accident, injury, or illness on your farm/operation?" 62% of participants indicated "yes." If a participant answered "yes" to this question, each of the hazards listed in Table 3 were then presented individually and for each one, he or she was asked, "Has this hazard ever been the source of an accident, injury, or illness on your farm/operation, and if so, was it reported to WorkplaceNL?" Table 4 summarizes participants' responses to this series of questions about individual hazards.

Table 4: Checklist of hazards as injury/illness sources with proportions of participants responding "yes"

Hazard	Proportion of "Yes" Responses	Hazard	Proportion of "Yes" Responses
Bending, lifting, twisting, and/or repetitive motion	16/37 (43.2%)	Chainsaws	2/37 (5.4%)
Slips, trips and falls	13/37 (35.1%)	Chemical exposures	2/37 (5.4%)
Animals	9/37 (24.3%)	Working alone	2/37 (5.4%)
Heat, cold, or wind	7/37 (18.9%)	Confined spaces	1/37 (2.7%)
Crushing	5/37 (13.5%)	Noise	1/37 (2.7%)
Dust	5/37 (13.5%)	ATVs	1/37 (2.7%)
Allergen	4/37 (10.8%)	Work-related stress	1/37 (2.7%)
Other equipment	3/37 (8.1%)	Power take-offs (PTOs)	0/37 (0%)
Electrical hazards	3/37 (8.1%)	Entrapment	0/37 (0%)
Fatigue	3/37 (8.1%)	Drowning	0/37 (0%)
Tractors	2/37 (5.4%)	Augers	0/37 (0%)

The hazard most frequently reported as having ever been the source of an injury or illness was 'bending, lifting, twisting,, and/or repetitive motion' (43.2% of respondents indicated this had been the source of an accident on their operation(s)), followed by slips, trips and falls, animals, and heat/cold/wind exposure. The hazards least commonly reported as having ever been the source of an injury or illness were PTOs, entrapment, drowning, and augers with 0 "yes" responses for each.

Of the 80 total "yes" responses (indicating 80 accidents/injuries/illnesses in total had occurred on operators' farms), **only 20 (25%) had been reported to WorkplaceNL.**

Legislation and compensation

Agricultural operations in NL are regulated under the *Occupational Health and Safety Act and Regulations, 2012* (Government of Newfoundland and Labrador, 2012). Agricultural operators were asked, "Are you aware of this legislation and of the ways in which it applies to you?" Of the 37 participants, only 14 (37.8%) said that they were familiar with the legislation. Less than a third of participants (29.7%) had ever received a visit from an OHS officer and a majority (63.6%) of these were fur and dairy operators.

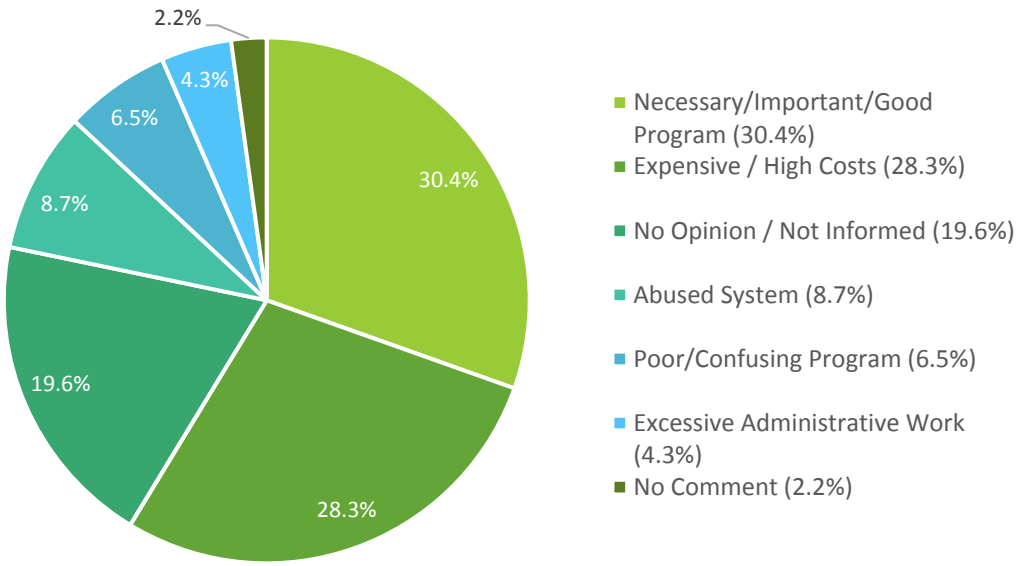
For each agricultural operation, participants were also asked to indicate whether workers' compensation coverage was provided for employees as well as whether they themselves were covered by workers' compensation. Table 5 documents the reported coverage patterns for operations both with and without employees. Of the 31

operations reported to have employees, **25 (80.6%) had workers' compensation coverage for those employees**, while 6 (19.4%) did not. All 19 incorporated farms with employees had coverage for the employees, but **only 68.7% of these had coverage for the owner/operator** as well. None of the 11 operations without employees had coverage for the owner/operator – not even those that were incorporated.

Table 5: Compensation coverage within our study sample		
Operations With Employees (N = 31)		
Coverage for Employees?	Incorporated	Non-Incorporated
Yes	19	6
No	0	6
Coverage for Owner/Operator?	Incorporated	Non-Incorporated
Yes	13	2
No	6	10
Operations Without Employees (N = 11)		
Coverage for Owner/Operator?	Incorporated	Non-Incorporated
Yes	0	0
No	3	8

Interviewee comments provided some insights into agricultural operators' thoughts about the province's workers' compensation program. Figure 1 summarizes responses to the open-ended question, "What do you think of the overall compensation program in Newfoundland?"

Figure 1: Participants' thoughts on the workers' compensation system



Less than a third (30.4%) of responses to this question focused on the benefits offered by the provincial workers' compensation program. For instance, one operator stated that workers' compensation "is there for the workers and for the farmers, so it protects both parties." The most commonly reported concern about the system was paying "premiums disproportionately high for small operations" (referenced by 28.3% of participants). Four operators of farms with employees talked about their income level and the difficulties they faced in paying workers' compensation premiums. Some suggested that the system does not adequately take the type of farming into account when assessing insurance premiums. "Lumping everyone in one group, regardless of the operation type" when setting premiums was considered to be a barrier by some participants.

Some operators indicated that their children or grandchildren are often present on the farm, at times helping with farm tasks. Related to this, study participants were asked, "Do you know if children are covered under this program (workers' compensation)?" Out of our 37 participants, 25 (67.6%) answered they did not know whether or not children are covered while the remaining 12 (32.4%) knew that children are only covered if they are paid employees.

Participants were also asked whether or not they were aware of the PRIME program available through WorkplaceNL, [2] which allows eligible employers to receive a 5% refund on their base assessment rates if they meet certain requirements for good occupational health and safety (OHS) and return-to-work practices. Only 19 (51.4%) of our 37 participants were aware of the program. Of those, only 7 (18.9%) reported having actually applied for PRIME, including some dairy, fur, vegetable, and fruit farm operators.

Review of Research on Tractor Safety and ROPS

Our interview schedule included a number of questions specifically focused on tractor ownership and safety. These questions were linked to our involvement in a program of research being undertaken by the Prairie Agricultural Machinery Institute (PAMI) aimed at designing safe and affordable rollover protection structures for older tractors that can potentially be built and installed by operators. The questions were informed by insights from a literature review of prevalence, risks, and barriers to adoption of ROPS on

[2] http://www.workplacenl.ca/prime/prime.whscc

tractors carried out as part of this larger program of research. The methods and findings used for this literature review are discussed in more detail in Butler, Vincent, Neis, Hagel and Sorensen (2015).

Our review of research on tractor rollovers found they have been the primary cause of work-related fatalities in agriculture in many industrialized countries (Day, Rechnitzer, & Lough, 2004; Springfeldt, 1996; Jenkins et al., 2012; Yoder et al., 2013). For instance, in the USA, reports on nearly a third of all work-related farming deaths in an 18-year period identified farm tractors as the primary reason for the fatality (Biddle & Keane, 2012). **ROPS, when paired with seatbelts, are widely recognized as being the most effective source of protection in the event of an overturn** (Sorensen et al., 2008; Springfeldt, 1996)**. Used together, a ROPS and a seatbelt are 99% effective** (NIOSH, 2004, as quoted in Jenkins et al., 2012, pp. 103-104)**.**

Coverage of ROPS on tractors in countries where previous research has been done was nowhere near the 75%-80% level that, according to Swedish studies (Springfeldt, 1996), would be needed to bring fatality numbers to near zero. For instance, a Canadian study by Pickett, Hagel, Dosman, and the Saskatchewan Farm Injury Study Team (2012) estimated that only 57% of farm tractors in Saskatchewan were equipped with ROPS (p. 422).

NL survey tractors, ROPS, and seatbelt use findings

In our NL survey, operators were asked, “How many tractors do you have on your farm/operation?” and, “What make(s)/model(s) are your tractors?” Out of 37 participants, 33 (89.2%) reported owning at least one tractor or similar machine, with a total of 97 machines reported. The largest reported number of tractors on a single operation was 14, with an average of 2.9 tractors per operation across the sample. The most common machine makes were New Holland and Kubota with 42.2% of reported tractors being from one of those two manufacturers.

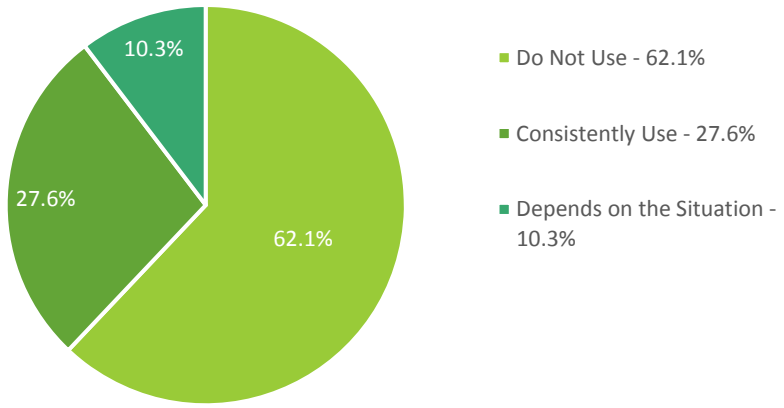
When asked, “In your experience, what are the **main hazards associated with working on tractors?” participants most commonly reported rollovers/tipping and PTOs**, with each being identified by 73% of participants.

When asked, “Have you or has anyone on your farm/operation ever had a close call while working on a tractor?” **21 (56.8%) of 37 participants reported that they or someone else on their farm/operation had experienced a tractor-related close call.**

Most tractors on participating operators' farms were newer. As a result, since ROPS have been required on tractors sold since the 1980s, a full 88.7% of the tractors/machines in our dataset were reported to be equipped with ROPS. Somewhat fewer, 77.1%, were equipped with seatbelts, and 83.3% were equipped with PTO shields. ROPS are thus much more common than in the Saskatchewan-based study discussed above.

The effectiveness of ROPS in preventing accidents is linked to wearing seatbelts. Figure 2 summarizes participants' responses to the question, "If any of your tractors are equipped with a seatbelt, do you wear it?" **Only 8 (27.6%) of the 29 owners of seatbelt-equipped tractors reported that they consistently wear their seatbelt**, while 18 (62.1%) reported that they do not wear it and 3 (10.3%) reported that it depends on the situation. When asked, "Why or why not?" the participants who do not wear seatbelts often indicated that it was because they were on and off the machine or that they simply didn't feel it was necessary to wear it. Other reasons given for not wearing a seatbelt included, "seatbelts restrict my ability to manoeuver," "I'm not travelling long distances so I don't need to wear it," "I have a cab so I don't need to wear it," or "neglectfulness."

Figure 2: Seatbelt usage for participants with seatbelt-equipped tractors/machines.



The survey also attempted to determine whether agricultural operators were open to adding ROPS onto non-ROPS-equipped tractors, and how much they would hypothetically be willing to pay for such a ROPS. Of the 37 survey participants, 25 (67.6%) indicated that they would hypothetically be willing to buy an after-market ROPS to retrofit a non-equipped tractor. When asked, "Roughly how much would you be willing to pay for such a ROPS?" these participants cited prices ranging from $200 to

$3,000, with a mean of $1,220 and a median of $1,000 0. **See Appendix B for information on the low-cost ROPS program linked to this study.**

Employees and agricultural safety training

Due to the nature of agricultural operations, most workers are employed during the spring/summer seasons. They come from local and regional areas, from other parts of the province, and sometimes from other countries. The growing use of foreign workers on operations in NL fits with the larger trend in Canada as a whole, and has many implications for farm safety (Pysklywec, McLaughlin, Tew, & Haines, 2011, Hennebry, 2012). One study participant indicated that with foreign workers, the language barrier can generate many additional safety hazards. This was reiterated in interviews with some stakeholders, who reported that one major problem at present is the difficulty in finding workers for farms, leading to the recruitment of foreign workers and creating an additional safety hazard resulting from language barriers.

Some operators have volunteer or unpaid family and friends who work on their operations, some of whom are recruited locally through friendship and kinship networks and others through programs like WWOOFERS.[3] While our systematic review results suggest there is limited research on volunteer safety on farms, some from Australia suggests that this group is vulnerable to injury and is generally not covered by workers' compensation insurance (Driscoll et al., 2003). This is the case in NL; WorkplaceNL only insures paid employees.

Health and safety training

When asked, "Do you have any formal agricultural safety training?" **18 (48.6%) of our 37 participants reported having some type of formal training**, while 13 (35.1%) reported having transferrable safety training from another job or source outside of their agricultural work and 6 (16.2%) reported having no formal training at all.

In our survey, most operations (31/42, or 73.8%) had paid employees and some operations, including some dairy and fur farms, had fairly large numbers of full-time employees. Of the 27 operators with employees, **only 10 (37%) reported that their employees had at least one of the following: basic first aid, pesticide application,**

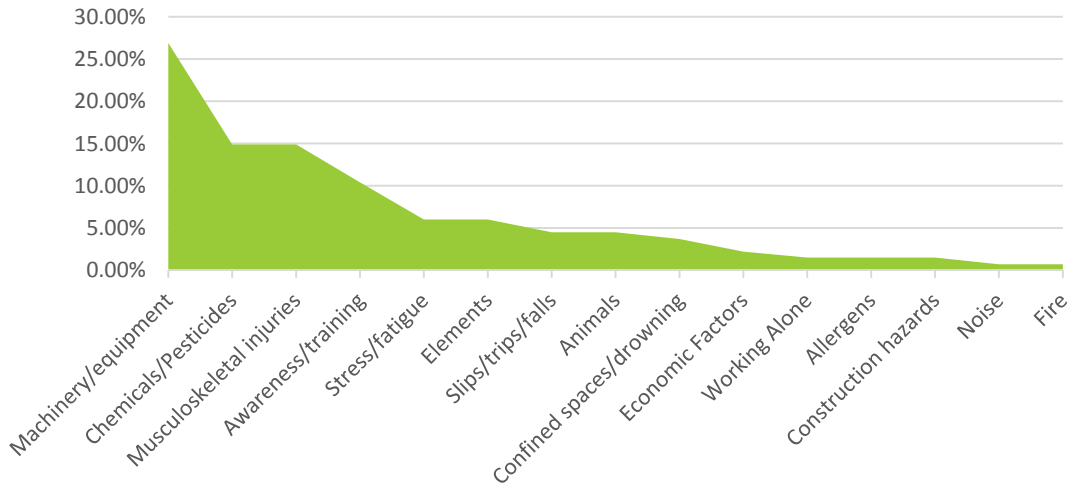
[3] World Wide Opportunities on Organic Farms provides organic agriculture volunteers from around the world who work on farms in return for food, accommodation, and experience (WWOOF 2015).

WHMIS, or CPR. Two (66.7%) of our 3 fur farm operators indicated that their employees had fall arrest and forklift training. In response to questions about training, some operators noted that they limit the tasks and responsibilities given to untrained employees involving dangerous machinery such as tractors and other implements. Some operators commented, for instance, that in order to ensure safety, employees only perform very rudimentary tasks and they wouldn't be "let loose" on whatever they wanted to do.

Operators' agricultural safety issues and priorities

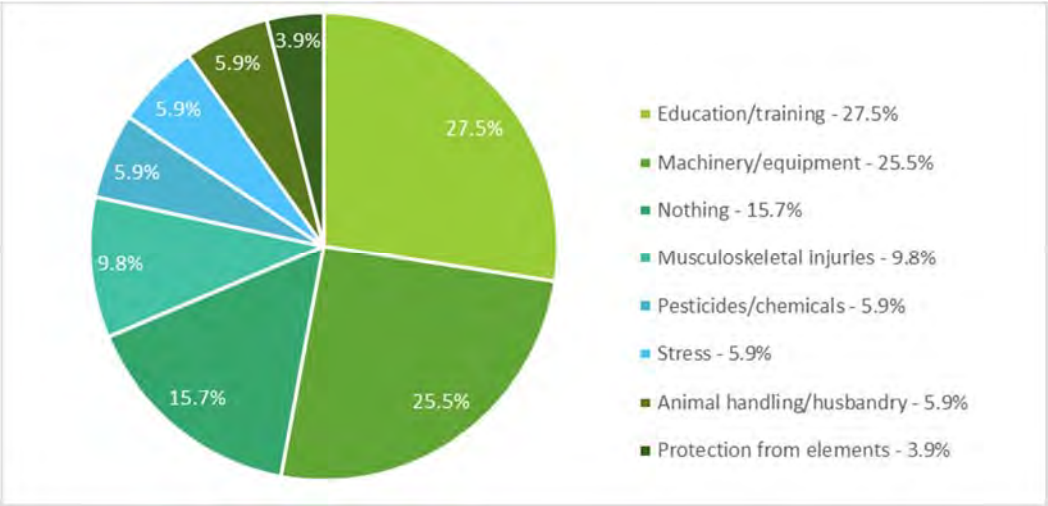
Figure 3 shows overall participant responses to the question, "In your opinion, what are the top four agricultural health and safety issues in Newfoundland and Labrador?" In total, participants made 134 issue selections in response to this question (not all selected four). As can be seen in Figure 4, machinery and equipment was the most frequently selected issue (26.9% of selections), followed by chemicals/pesticides (14.9%), musculoskeletal injuries (14.9%), and awareness/training (10.4%). Issues related to stress/fatigue and the elements were also included in many operators' lists.

Figure 3: Participant-identified agricultural health and safety issues in NL



Participants were also asked what types of agricultural safety issues they would like to know more about. The most frequent response to this question was in some way related to education or training (27.5% of all issues mentioned). Information pertaining to machinery ranked second in terms of frequency (25.5%). 'Nothing' ranked third at 15.7%, followed by pesticides, musculoskeletal injuries and stress (see Figure 4).

Figure 4: Agricultural safety issues operators would like to know more about



CONCLUSIONS AND SUGGESTIONS FOR FUTURE ACTION

This report provides an overview of findings from the first research initiative in NL on agricultural safety. The research was supported by contributions from federal and provincial funds, as well as substantial staff and financial contributions from Memorial University including the SafetyNet Centre for Occupational Health and Safety Research (SafetyNet). It came about because of SafetyNet's involvement in a national initiative involving Agrivita, the Canadian Centre for Health and Safety in Agriculture. The latter organization has been carrying out health and safety research and intervention for thirty years and is an important Canadian resource in the field.

Our literature reviews, contextualized for the NL industry, and our survey of a sample of agricultural operators in NL identified a number of major OHS hazards for agricultural operators in this province that are similar to those associated with agriculture elsewhere. Some are more unique to the province and, as in the case of fur farming and fruit operations, under-researched not only here but elsewhere.

Operators identified a variety of hazards as present on their agricultural operations. These hazards are similar to the ones identified in the review of agricultural safety research contextualized for the NL industry including: machinery; bending, lifting, and

twisting; slips, trips, and falls; chemical exposures; and, noise-induced hearing loss. Reported hazards varied somewhat by commodity group and were, in some cases, unique to production systems for particular commodity groups. For example, fur farmers frequently selected "other" equipment as a hazard from our survey list.

Many of the hazards identified by participants have contributed to accidents, injuries, and illness on their operations. The most frequently identified sources of these are: 1) bending, lifting, twisting and/or repetitive motion; 2) slips, trips and falls; 3) animals; and, 4) weather elements such as sun, heat, cold, and wind.

Newfoundland and Labrador regulates OHS through regulation 5/12 under the *Occupational Health and Safety Act* (O.C. 2012-005) (Government of Newfoundland and Labrador, 2012). This act has many implications for the agricultural industry, including regulations on working alone, hazardous materials, ROPS, and noise. However, only 37.5% of survey respondents indicated that they were aware of the legislation and the ways in which it applies to them and relatively few had ever received a visit from a health and safety inspector.

Newfoundland and Labrador includes the agricultural sector in its compensation system. This is mandated under the *Workplace Health, Safety and Compensation Act* of Newfoundland and Labrador which states, "[a]ll incorporated entities operating in Newfoundland and Labrador must register with the Commission." Under the Act, coverage is mandatory for all workers, including the owner, even if the owner is the only worker (Personal Correspondence, Steven Thistle, April 30, 2015). In this study, 100% of incorporated farms with employees had coverage for employees but only 68.4% of those operations had coverage for the owner/operators themselves. Overall, only 59.5% of study operations had some form of workers' compensation coverage. Thus, while operators of incorporated farms are following the regulations regarding their employees, coverage is less common on unincorporated farms and among the operators themselves. This is a concerning trend as operators may, in some cases, be the ones who are most exposed to the hazards on their farms or operations and they may be working more frequently with dangerous machines, as many operators indicated they did not let untrained employees do this work. **Lack of compensation coverage could make operators vulnerable to loss of livelihood if they are injured and to being sued by injured workers and volunteers.**

Participants' responses indicate that only 25% of the work-related accidents, injuries, and illnesses identified in our study had been reported to WorkplaceNL. This means

that 75% of these injuries were not reported despite the hardships to farm families that accidents and injuries often produce. Although participants in this study were not asked why such incidents were not reported, a significant proportion of non-reporting could be explained by the fact that 40.5% of the operations in our sample did not have WorkplaceNL coverage.

Study participants had mixed feelings about the workers' compensation system, with some stating that it is necessary, others suggesting that it is too expensive, and still others having no knowledge of the system whatsoever. Additionally, many study operators were not aware of the PRIME program offered by WorkplaceNL and fewer still had applied for it. This again points to a **potential lack of resources or dedicated personnel, in this circumstance, when it comes to communication of potentially beneficial or cost-reducing programming**. This is of particular concern as many operators identified the high costs of the system as being a challenge of the compensation system.

While the results on tractor rollover protection structure (ROPS) prevalence in the sample are promising (in that 88.7% of tractors were fitted with ROPS), **the findings on seatbelt usage are less encouraging**. While many agricultural operators indicated that their tractors have ROPS, many also admitted they often did not wear their seatbelts. Tractor seatbelt usage is a concern because of its implications for ROPS effectiveness. When used together, seatbelts and ROPS will protect an operator in the event of an overturn, and a seatbelt will keep an operator within a safety zone in the event of a collision or keep them from falling from the tractor seat (Myers, Cole, & Westneat, 2006).

The primary objectives of this research were to document some of the main agricultural safety hazards in this province and to develop a plan for knowledge mobilization taking the priorities of local operators into account. When asked to select their top four agricultural health and safety issues in NL, the issues most frequently mentioned by participants overall were: 1) machinery and equipment; 2) chemicals/pesticides; 3) musculoskeletal injuries; and, 4) awareness/training.

The small size of the NL agricultural sector, its diversity, and its widespread dispersal pose challenges for addressing the multiple OHS hazards and some of the operator priorities identified through the research including training, injury prevention, and prevention of occupational disease. There are also some potential challenges associated with making regulatory and workers' compensation systems work effectively for them.

Regardless, failure to address these challenges could threaten the future sustainability of the food system because **sustainable food systems require a vision that incorporates attention to human resources and measures to protect the health of farm families and agricultural workers** (Barnetson, 2009).

Promoting agricultural safety in NL requires developing a long-term strategy to address the hazards, issues, and priorities identified in this study. Related to this, we note the following:

1) The OHS experiences of NL agricultural operators are somewhat similar to those in other Canadian provinces and in other countries, but they are not entirely the same. Existing agricultural safety resources developed in other places should be adapted and transferred to the geographical context and commodity types of operations in NL (see Appendix C). However, not much appears to have been done in this regard and the small size, diversity, and wide dispersal of the sector may make it challenging to do this work in a cost effective fashion.

2) Protection of the longer term resilience of the main types of commodity production in NL (and in Atlantic Canada), including fur farming and fruit production, is under-researched globally. These commodities are important to the province and to the region and protection of the longer term resilience of these operations and health of operators and employees requires OHS research that is unlikely to be undertaken in other parts of the country.

3) In both large and small operations, participants indicated lack of training resources as a critical health and safety issue with just over 60% of employees on participating operations having no safety training and close to 30% of farm operators indicating they would like to have access to more training resources. Many agricultural operators and industry stakeholders expressed concern over the lack of tools available to train employees while identifying that on-site training would be ideal. An important challenge for smaller operators in particular may be that they do not have the money or time to send people to training events or workshops (or to go to them themselves). Interview results point to the economic fragility of some operations and to challenges around labour shortages as reflected in the age of farmers and reliance on volunteers on some operations.

4) Some participants were not aware of the OHS-related regulations and legislation that apply to the industry**.** To address this, government, commodity groups, and the NL Federation of Agriculture could work in closer cooperation to understand and

communicate information about the regulations more effectively taking into account the economic fragility of many agricultural operations.Economic fragility may be contributing to concerns expressed by interviewees about the potential consequences of health and safety regulations and compensation costs for the viability of their operations and to the fact that some operators are not covered by workers' compensation.

5) Findings suggest diversity and the large proportion of small farms, as well as other factors, may be limiting use and acceptance of the workers' compensation system among some operators. Multiple accidents and illnesses were documented in the research, many of which were not reported to workers' compensation (not all operators and their employees are part of the compensation system). Operators concerns that a 'one-size-fits-all' approach to training, regulation, and compensation is unlikely to work well for small operations are supported by the findings of research on OHS in small and medium-sized enterprises from elsewhere (Eakin, MacEachen and Clarke 2003). Since prevention is part of the mandate of WorkplaceNL, lack of involvement with the system may be limiting some operators' access to information on prevention and opportunities to reduce their compensation costs. A dedicated agricultural safety person at WorkplaceNL who could work with the sector on issues of prevention and on understanding the workers' compensation more generally could be an important asset to the sector and the province.

6) The presence of an effective organization representing much of the agricultural sector, and of commodity-specific associations in NL are important advantages for development and coordination of education and training. These organizations would, however, require support to embark on work in this area. One way to achieve this objective and many of the other suggestions outlined in this section would be to establish and support a safety sector association for agriculture or for food production (excluding fishing) and processing more generally for the province. Under the guidance of a safety sector association, the development of targeted research and programs aimed at preventing and reducing injuries and illnesses that are delivered in multiple regions of the province through various educational institutions and other organizations could improve agricultural safety and safety in food production and processing more generally in the province.

7) The absence of a strong national initiative around agricultural safety may be contributing to risk in the sector, particularly in this and other provinces where the

sector is relatively small and thus where there are limited provincial-level resources for education, training, and other forms of intervention. Provincial leaders in government, industry, and WorkplaceNL should consider encouraging the federal government to re-invest in agricultural injury surveillance and in injury and illness prevention.

8) Temporary foreign workers and other types of migrant workers are groups that play a crucial and growing role in agricultural operations in other parts of Canada. There are some Temporary Foreign Workers and international volunteers recruited as WWOOFERs in NL and the numbers appear to be growing. Temporary Foreign Workers are a federal responsibility and information about recruitment and the location of these workers is not always shared between the federal government and the provinces. These workers have been shown to be at elevated risk of injury, illness, and fatality in other parts of Canada. Careful monitoring of trends in hiring of foreign workers and knowledge of the places where they are employed could help government develop targeted initiatives to try to protect their health and safety. WWOOFERS and other 'volunteers' including children are not covered by workers' compensation but strategies to support their training and safety would benefit them and the longer-term sustainability of the parts of the sector where they are employed.

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APPENDIX A

THE NEWFOUNDLAND AND LABRADOR AGRICULTURAL CONTEXT: A COMPARISON WITH THE OVERALL CONTEXT IN CANADA

The Newfoundland and Labrador Agricultural Context: A Comparison with the Overall Context in Canada

Chrissy Vincent

November 2nd, 2016

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INTRODUCTION

Farming is one of the most dangerous occupations globally, with high rates of injury, fatality and occupational disease. Research focused on occupational health and safety within the agricultural sector is, therefore, critical in helping to reduce these risks to agricultural operators and their employees. Although research on this topic has previously been conducted in many parts of the world, including certain regions of Canada, there had been no such studies with a specific focus on the agricultural industry within Newfoundland and Labrador (NL) until SafetyNet undertook the study of which this paper is a part, starting in 2014.

Designing and interpreting the results of research on agricultural safety in NL and comparing those results to the situation elsewhere requires a good background understanding of the province's agricultural industry as a whole, and how it compares to other parts of Canada. This paper uses the statistical information available to the general public from the 2011 Canadian Census of Agriculture to paint a broad picture of our province's agricultural sector, and to compare it with the overall Canadian context. The following is a summary our findings, which we intend to update with new data from the 2016 Census of Agriculture when it becomes available to us.

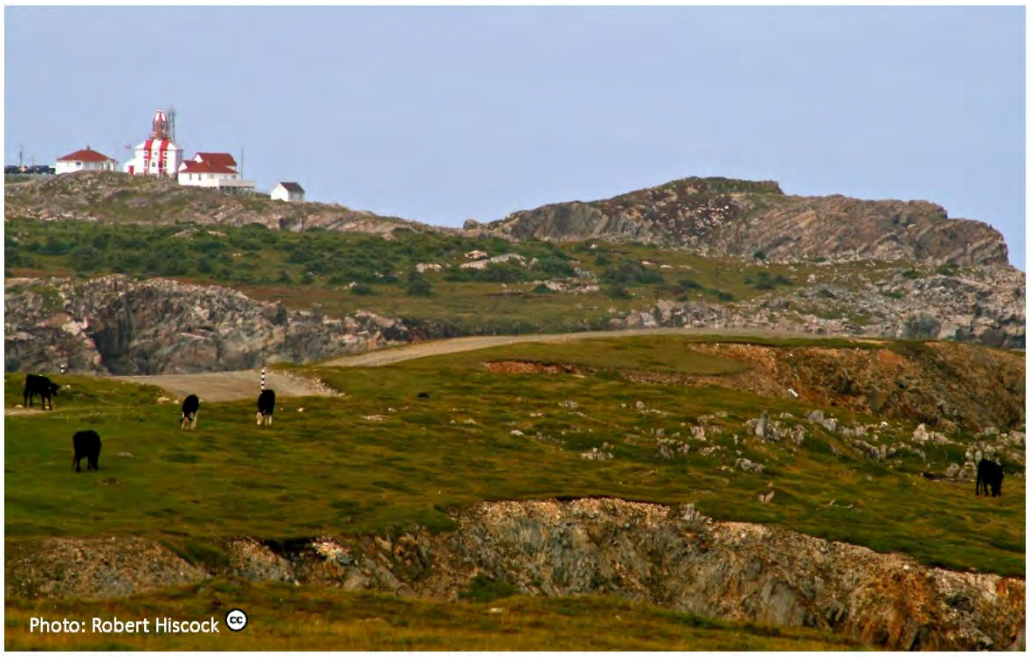


Photo: Robert Hiscock

NUMBER AND SIZE OF FARMS

NL has a small number farms compared to other parts of Canada. The 2011 Census counted a total of 205,730 census farms (defined as operations that produce agricultural products for sale) in Canada. Only 510 of these were located in NL, which means that NL farms comprise only 0.25% of all farms in the country. The province with the next smallest number of farms was PEI, with 1495 farms – still almost triple the number for NL. The province with the largest number of farms was Ontario, with an incredible 51,950.

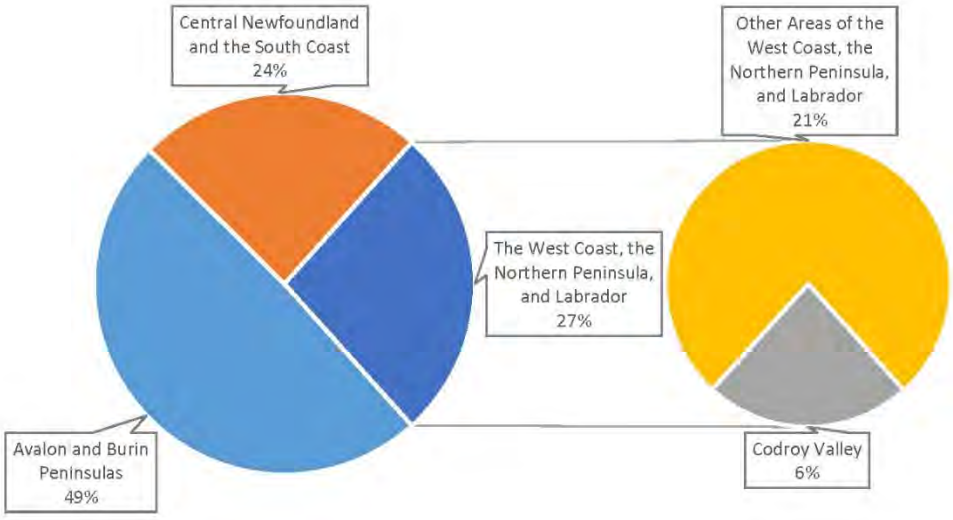
In addition to comprising a very small share of total Canadian farms, NL farms are also, on average, much smaller in size. The Census counted a total of 160,155,748 acres of farmland in Canada, of which only 77,349 (0.04%) were located in NL. The average reported farm size in NL was 152 acres, as compared to an overall Canadian average of 778 acres. The province with the next smallest average farm size was Ontario, with 244 acres – still over 1.5 times as large as the NL average. The province with the largest average farm size was Saskatchewan with 1668 acres. It should be noted that the distribution of farm sizes among the Canadian provinces is quite bimodal, with Manitoba, Saskatchewan and Alberta all averaging over 1000 acres, and all other provinces averaging fewer than 400 acres. This size discrepancy between the Prairies and the other provinces may be due to the greater preponderance of grain and cattle farms in the Prairies in comparison to elsewhere.

Table 1: Number and Average Size of Farms, Canada and the Provinces

REGION	NUMBER OF FARMS	AVERAGE FARM SIZE
CANADA	**205,730**	**778**
Newfoundland and Labrador	510	152
Prince Edward Island	1,495	398
Nova Scotia	3,905	261
New Brunswick	2,611	359
Quebec	29,437	280
Ontario	51,950	244
Manitoba	15,877	1,135
Saskatchewan	36,952	1,668
Alberta	43,234	1,168
British Columbia	19,759	327

Within NL, over half (267, or 52.35%) of the 510 counted farms were located on the Avalon and Burin Peninsulas – though most of these were on the Avalon, as the Burin Peninsula had too few farms to be separately reported (for reasons relating to confidentiality). Another 132 (25.44%) were located in Central NL, including the South Coast. Of these, only a very small handful were actually located on the South Coast (again, there were too few of them to be reported separately). The rest were distributed relatively evenly across the centre of the island, Bonavista Bay, and the Bay of Exploits. The remaining 111 farms (21.76%) were located on the West Coast, Northern Peninsula, and in Labrador. Of these, 34 (30.63%) were located in the Codroy Valley, and the rest were located in the other portions of region. The majority of these remaining 77 farms were located in the area of Corner Brook and Deer Lake, though, as both the Northern Peninsula and Labrador had too few farms for separate numbers to be reported.

Figure 1: Geographical Distribution of NL Farms

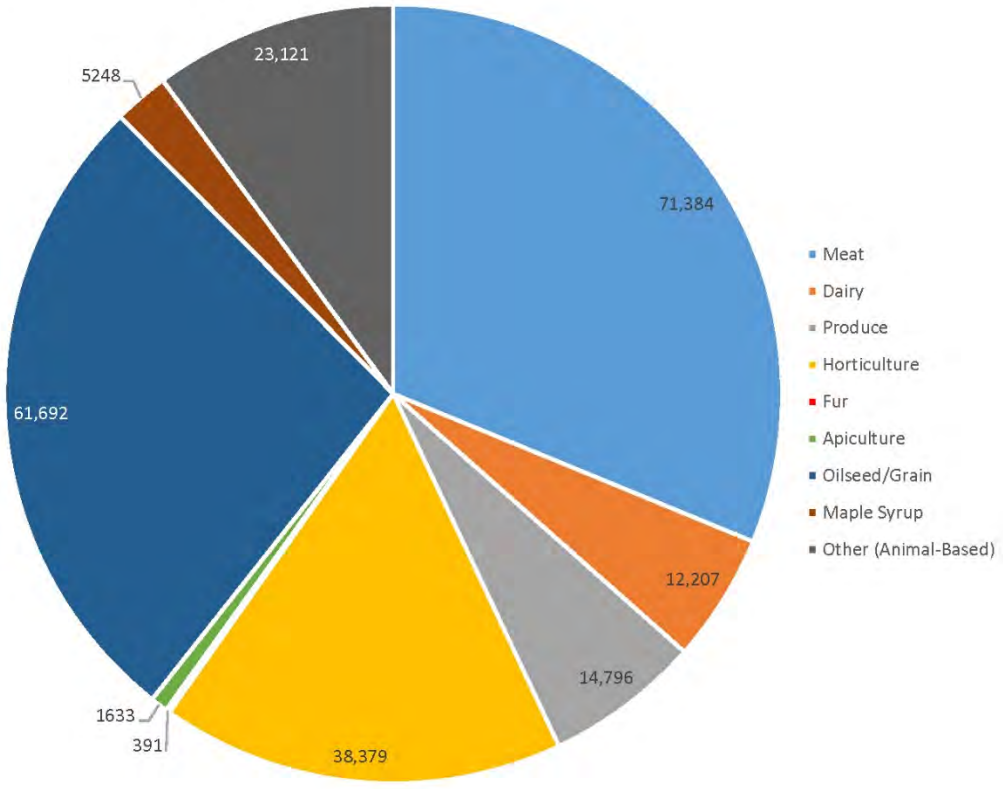


With respect to size, a full 324 of the 510 counted NL farms (63.53%) were smaller than 70 acres, and of these, 121 were smaller than 10 acres. Only 48 (9.41%) were 400 acres or larger, with 21 (43.75%) of these larger farms being located on the Avalon and Burin Peninsulas, 10 (20.83%) being located in Central NL including the South Coast, and 19 (39.58%) being located on the West Coast, Northern Peninsula, and in Labrador. Only 9 of these larger farms exceeded 1600 acres, of which 5 were located on the Avalon and Burin Peninsulas, 1 was located in Central NL including the South Coast, and 3 were located in the region comprising the West Coast, the Northern Peninsula, and Labrador.

COMMODITIES PRODUCED

Of the 205,730 farms counted in Canada, 71,384 (23.46%) were classified as meat production operations (including cattle ranching, pig farming, poultry and egg production, and sheep farming), 12,207 (5.93%) were classified as cattle-based dairy operations, 14,796 (7.19%) were classified as produce operations, 38,379 (18.66%) were classified as other types of horticultural operations, 391 (0.19%) were classified as fur farms, and 1633 (0.79%) were classified as apicultural operations. The remaining farms were classified as either oilseed/grain farms (61,692 farms or 29.99% of the national total), maple syrup production operations (5248 farms or 2.55% of the national total), or other types of animal-based operations (23,121 farms or 11.24% of the national total). The latter category includes operations raising horses, goats, and/or combinations of multiple animal species.

Figure 2: Commodity Distribution for Canadian Farms



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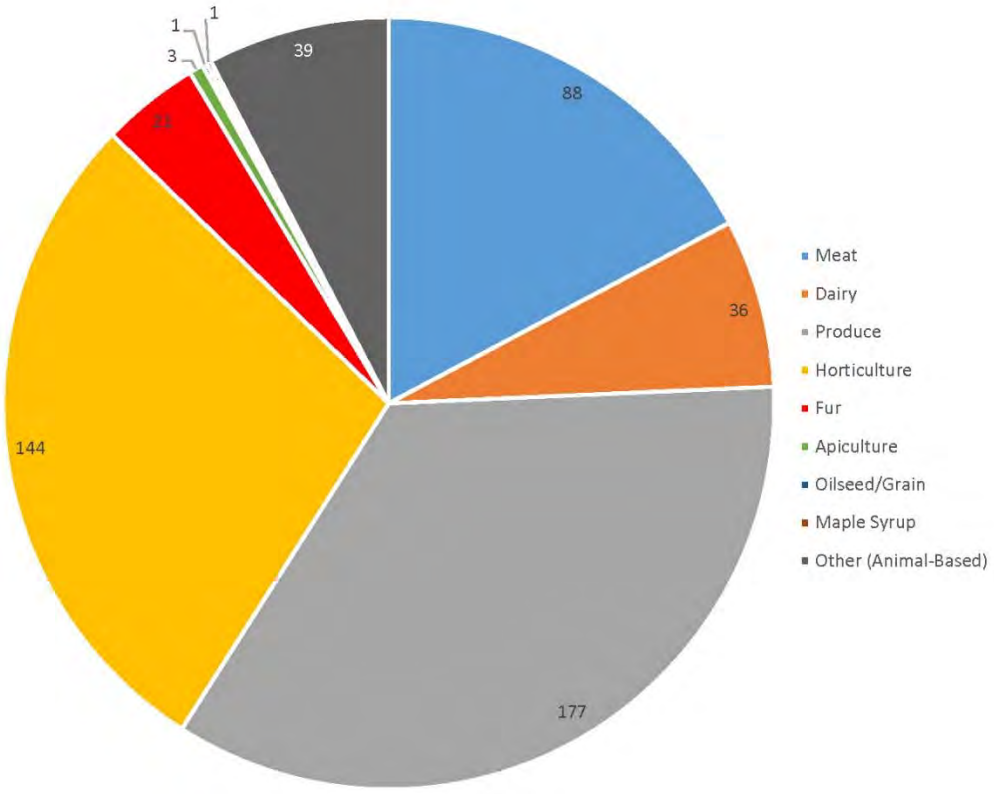
The commodity distribution for NL was somewhat different. Of the 510 farms counted in NL, 88 (17.25%) were classified as meat production operations, 36 (7.06%) were classified as cattle-based dairy operations, 177 (34.71%) were classified as produce operations, 144 (28.24%) were classified as other types of horticultural operations, 21 (4.12%) were classified as fur farms, and 3 (0.59%) were classified as apicultural operations. The majority of the remaining farms (39 farms or 7.65% of the provincial total) were other types of animal-based operations, primarily farms raising horses and combinations of multiple animal species. There was only 1 grain farm and 1 maple syrup production operation counted in the province (each comprising 0.20% of the provincial total). In comparison to Canada as a whole, then, the most striking differences are that NL has proportionally more produce, horticultural, and fur operations, and proportionally fewer grain and meat operations.

Figure 3: Commodity Distribution for NL Farms



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Within NL, the Census revealed that meat production operations tend to be located mainly on the easternmost side of the province – 59 of the province's 88 counted meat production operations (67.05%) were located on the Avalon and Burin Peninsulas, while 12 (13.64%) were located in the Central NL and South Coast region and 17 (19.32%) were located in the West Coast, Northern Peninsula, and Labrador region. Most cattle-based dairy operations are on the eastern and western sides of the province, with only 7 (19.44%) of the province's counted total of 36 being centrally located. Produce farms are scanty on the western side of the island and in Labrador, but have a large presence on the Avalon and Burin Peninsulas (86 of the province's 177, or 48.59%, were located there) and in Central NL including the South Coast (61 of the province's 177, or 34.46%, were located there). Horticultural operations follow a similar pattern to meat-producing operations, with 72 of the province's 144 (50.00%) located on the eastern side of the province, and the remainder split almost evenly between the central and westernmost parts of the province. Fur farms are very evenly distributed, with 8 (38.10%), 6 (28.57%), and 7 (33.33%) of the province's counted total of 21 being located in the easternmost, central, and westernmost parts of the province, respectively. Of the province's 3 counted apicultural operations, one was on either the Avalon or Burin Peninsula, and two were in the West Coast, Northern Peninsula, and Labrador region. The province's other types of animal-based operations are located primarily on the East Coast, with 22 (56.41%) of the counted 39 located on the Avalon and Burin Peninsulas. Only 6 (15.38%) of these types of farms were located centrally, and the remaining 11 (28.21%) were located on the West Coast, the Northern Peninsula, and in Labrador. The province's one counted grain operation was located in the easternmost portion of the province, and its one counted maple syrup operation was located centrally.


Photo: bizmac

FUR FARMING

Of the 391 fur farms counted in Canada, 128 (32.74%) were in Nova Scotia, 113 (28.90%) were in Ontario, 51 (13.04%) were in Quebec, 24 (6.14%) were in British Columbia, 21 (5.37%) were in Newfoundland and Labrador, 20 (5.12%) were in New Brunswick, 15 (3.84%) were in Prince Edward Island, 13 (3.32%) were in Manitoba, and 6 (1.53%) were in Alberta. There were no fur farms counted in Saskatchewan, the Yukon, or the Northwest Territories. This means that compared to some of the other provinces, Newfoundland and Labrador does not account for a very large share of the country's fur farming operations. In fact, it falls squarely in the middle.

When considering the share of each individual province's total farms that are accounted for by fur farming, however, a different picture emerges. In NL, fur farming accounts for 4.12% of the province's total farming operations. In Nova Scotia, this figure is 3.28%, and in Prince Edward Island, it is 1.00%. In all other provinces, the proportion of total farms accounted for by fur farms is smaller than 1%. Within the context of its own agricultural industry, then, Newfoundland and Labrador has a larger proportion of fur farms than any of the other Canadian provinces.

Table 2: Proportion of Total Farms Accounted for by Fur Farms, Canada and the Provinces

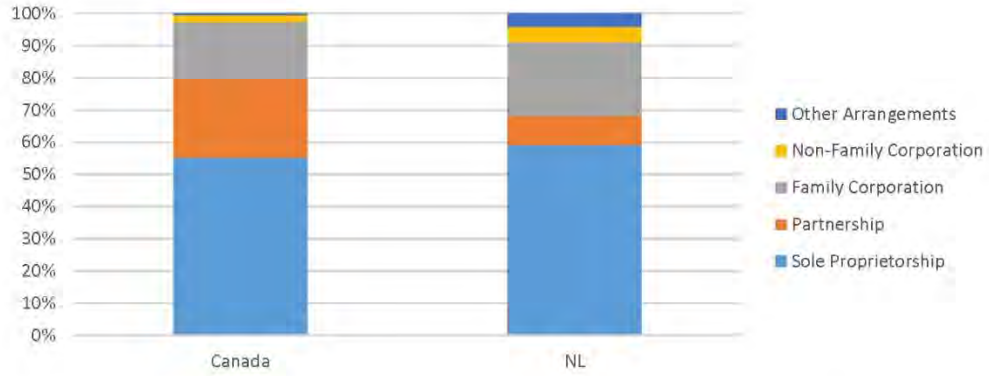
REGION	# OF FARMS	# OF FUR FARMS	PROPORTION
CANADA	**205,730**	**391**	**0.19%**
Newfoundland and Labrador	510	21	4.12%
Prince Edward Island	1,495	15	1.00%
Nova Scotia	3,905	128	3.28%
New Brunswick	2,611	20	0.77%
Quebec	29,437	51	0.17%
Ontario	51,950	113	0.22%
Manitoba	15,877	13	0.08%
Saskatchewan	36,952	0	0%
Alberta	43,234	6	0.01%
British Columbia	19,759	24	0.12%

FARM OPERATORS AND EMPLOYEES

The Census counted a total of 293,925 farm operators in Canada – a number which exceeds the total number of farms because not all Canadian farms are sole proprietorships. In fact, of the country's 205,730 counted farms, only 114,006 (55.42%) were reported as being sole proprietorships. Another 50,335 (24.47%) were reported as being partnerships, either with a written agreement (10,672 or 21.20% of partnerships) or without (the remaining 39, 663 or 78.80% of partnerships). Family corporations comprised 35,749 (17.38%) of Canadian farms, while 4,965 (2.41%) were reported as being non-family corporations and 675 (0.33%) were indicated as having other types of operating arrangements. Nationally, the average age of farm operators was 54.0 years, and 27.44% of them were female.

In NL, the Census counted a total of 665 farm operators. Again, this number exceeds the total number of farms in NL, because only 302 (59.22%) of NL's 510 counted farms were identified as sole proprietorships. Some NL farms (46, or 9.02%) were reported as being partnerships (41 of the 46, or 89.13%, with no written agreement), and a larger number (117, or 22.94%) were reported as being family corporations. Another 24 (4.71%) were reported as being non-family corporations, and 21 (4.12%) were indicated as having other types of operating arrangements. The average age of farm operators in NL was 55.0 years, and 23.31% of them were female.

Figure 4: Farm Operating Arrangements in Canada and NL



In Canada, 69,964 (34.01%) of the country's total farms reported paid labour. The Census counted 297,683 paid employees, of whom 112,059 (37.64%) worked year-round in a full or part-time capacity and 185,624 (62.36%) were seasonal or temporary workers. In NL, 264 (51.76%) of the provinces total farms reported paid labour – a much higher proportion than for Canada as a whole. The Census counted 1395 paid agricultural employees in NL, of whom 466 (33.41%) worked year-round and 929 (66.59%) were seasonal or temporary workers.

TRACTOR OWNERSHIP

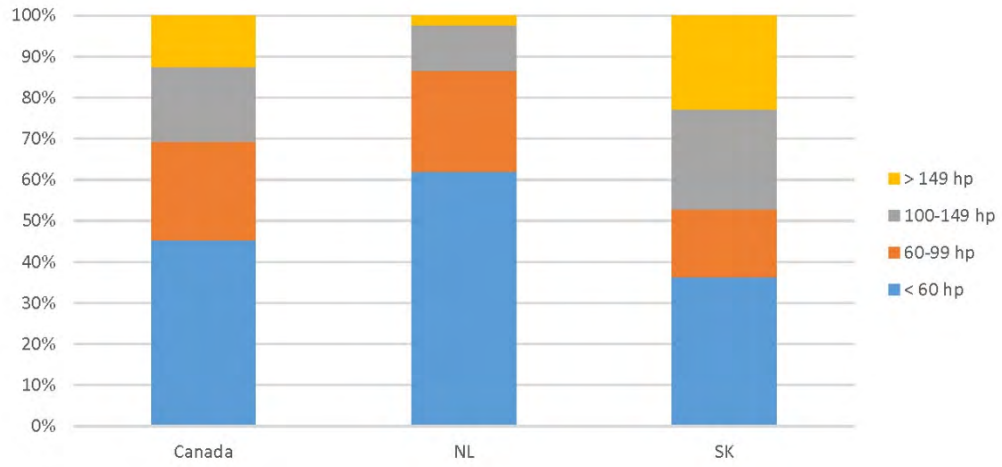
Out of the 205,730 counted farms in Canada, 190,162 (92.43%) reported having tractors. These farms reported a total of 685,914 tractors, which works out to an average of 3.61 tractors for each farm reporting their presence. Of these tractors, 311,782 (45.45%) were under 60 horsepower, 164,324 (23.96%) were between 60 and 99 horsepower, 124,127 (18.10%) were between 100 and 149 horsepower, and 85,681 (12.49%) were over 149 horsepower. The average market value of tractors reported in Canada was $20,464.13 per tractor.

Out of the 510 counted farms in NL, 397 (77.84%) reported having tractors – a smaller percentage than in Canada as a whole. These farms reported a total of 979 tractors, which works out to an average of 2.47 tractors for each farm reporting their presence. So, not only did a smaller proportion of NL farms report tractors, but those farms that did report tractors also reported fewer of them. Of these 979 tractors, 607 (62.00%) were under 60 horsepower, 241 (24.62%) were between 60 and 99 horsepower, 108 (11.03%) were between 100 and 149 horsepower, and only 23 (2.35%) were over 149 horsepower. The average market value of these tractors, however, was $21,058.57 per tractor. This is interesting because it indicates that although tractors in NL tend to be much smaller, they are also more expensive. This may mean that they are newer (on average) than the tractors in other parts of Canada.


Photo: Dennis Jarvis

For the sake of comparison, we also looked at the statistics on tractors for the province of Saskatchewan (SK), which has a very different commodity profile from NL. Out of the 36,952 farms in SK, 34,310 (92.85%) reported having tractors – a percentage that is essentially on par with Canada as a whole. These farms reported a total of 132,935 tractors, which works out to an average of 3.87 tractors for each farm reporting their presence. Again, this is on par with the average for Canada overall. Of these 132,935 tractors, 48,395 (36.41%) were under 60 horsepower, 21,790 (16.39%) were between 60 and 99 horsepower, 32,400 (24.37%) were between 100 and 149 horsepower, and 30,350 (22.83%) were over 149 horsepower. The average market value of these tractors was $22,974.37 per tractor – a little higher than for NL, but not nearly as high as would be expected given how much larger, on average, these tractors are. This may mean that tractors in SK tend to be older than tractors in NL.

Figure 5: Tractor Sizes in Canada, NL, and SK



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CONCLUSION

In general, the 2011 Canadian Census of Agriculture statistics presented here seem to indicate that the Newfoundland and Labrador agricultural context is appreciably different from the one that exists in Canada as a whole. The industry is significantly smaller (both in terms of number and size of farms) and produces primarily fruit, vegetables, and horticultural commodities rather than meat and grain, the latter of which are the backbone of the agricultural industry in Canada at large. Additionally, fur farming accounts for a larger proportion of farming activity in NL than it does in any other province in Canada – a fact which may partly explain why, even though NL farms are (on average) the smallest in the country, the proportion of them with full or part-time employees is so much higher than in Canada overall (other differences in commodity proportions may also play a role here). Unsurprisingly, tractors in NL tend to be both smaller and less prevalent. On average, however, those that are in use here have a higher market value, which may mean that they are newer and/or receive less hard use than those in other parts of the country.

The numbers presented here are simply a snapshot of the agricultural sector in Canada and NL as it existed in 2011. Given that these data are now five years out of date, it is possible that the industry may have changed or shifted in important ways since this information was collected and reported. As was mentioned previously, we plan to update this document with the new 2016 Census data when they are made available in an effort to capture any critical changes that may have taken place in the interim.

REFERENCE:

Statistics Canada (2011). *2011 Census of Agriculture.* [Publicly available data tables.] Retrieved from http://www.statcan.gc.ca/eng/ca2011/index.

APPENDIX B

TRACTOR ROLLOVER PROTECTION STRUCTURES (ROPS)

DECEMBER 2016

TRACTOR ROLLOVER PROTECTION STRUCTURES (ROPS)

REQUIREMENTS & TRACTOR SEATBELT USE

NEWFOUNDLAND & LABRADOR

BACKGROUND

Of the 510 farms in Newfoundland and Labrador (NL) counted in the Canadian Census of Agriculture, 397 (77.84%) reported having tractors on their operations in 2011.(1).

Tractor overturns or rollovers, machine run-overs and machine entanglements continue to be one of the most common causes of death and injuries on farms in Canada:

- 46% of all agricultural fatalities between 1990-2008 were due to machine-related causes (2)
- tractor rollover events accounted for 25% of Canadian farm-related deaths(3)

Tractor operators are most at risk of injury when:

1) their tractor(s) do not have rollover protective structures (ROPS)
2) they do not wear fitted seatbelts
3) their equipment is poorly maintained
4) work is conducted on a sloping terrain, and
5) their tractors are towing or pulling large loads.

Most tractors built before 1985 do not have ROPS.

ROPS ON NL TRACTORS

According to 2012 NL Occupational Health and Safety Regulations,(4) tractors and mobile equipment weighing 700 kilograms or more must be equipped with ROPS. In a recent survey of 37 agricultural operations in NL done in 2015 and 2016, more than 80%of participants indicated that they had tractors on their operations. Only 20 participants (54.1%) said that they were aware of provincial legislation requiring ROPS to be installed on their tractor(s).

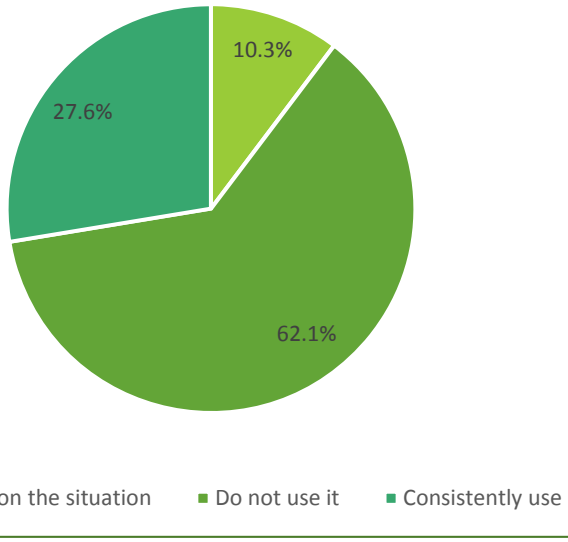
Of these tractors, 88.7% were reported to be equipped with rollover protection systems (ROPS). This level of ROPS protection is relatively high in the Canadian context but not 100%. Further, 77.1% of these tractors were reported to be equipped with seatbelts and 83.3% were equipped with power take-off (PTO) shields

ROPS & SEALTBELT SAFETY REQUIREMENTS

When tractors are equipped with ROPS and an operator is wearing a seatbelt, 99% of machinery-related rollover fatalities are preventable. Tractor operators must not only wear their seatbelts to fully benefit from ROPS protection, they must also tighten their seatbelt so they are confined within the ROPS protective area.

Of the tractors owned by surveyed participants, 77.1% were reported to have seatbelts. However, only 27.6% of respondents indicated they consistently wear their seat belts, 62.1% reported not wearing them, and seatbelt use "depends on the situation" for 10.3% of respondents (Figure 1).

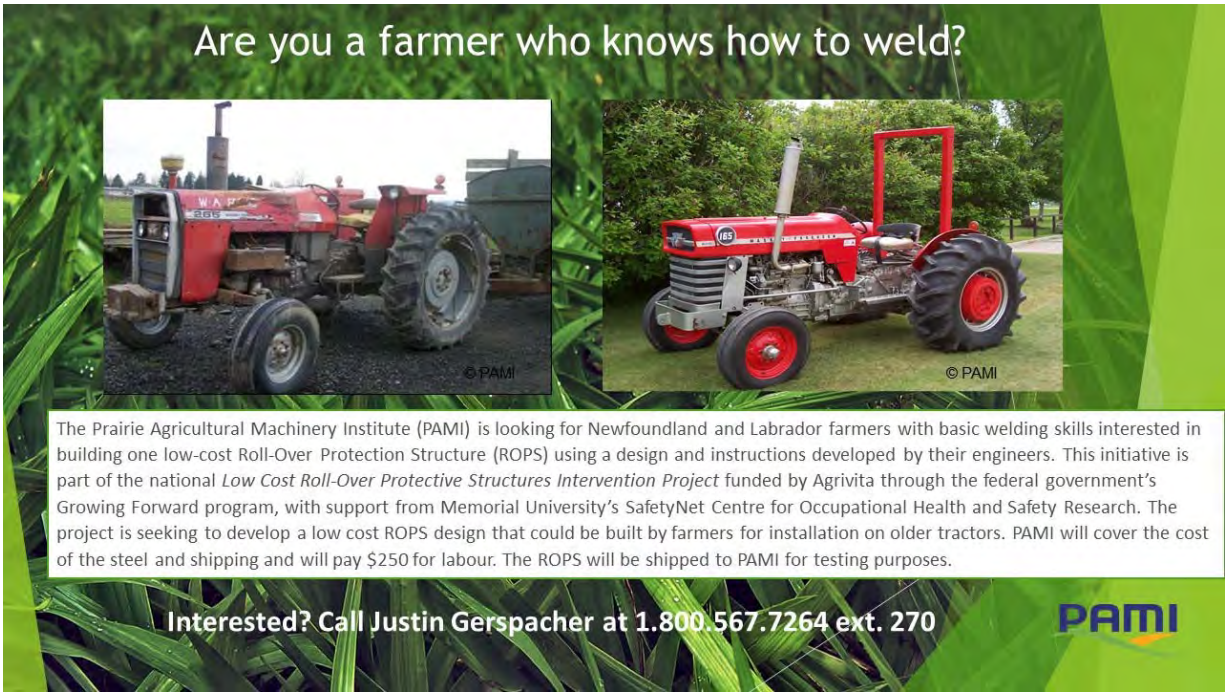
Figure 1: Survey participants' responses to the question, "if any of your tractors are equipped with a seatbelt, do you wear it?"



THE LOW-COST ROPS PILOT PROGRAM

Engineers at the Prairie Agricultural Machinery Institute (PAMI) are developing and testing a set of ROPS designs for older tractors that are relatively inexpensive and can be built and installed by operators. This project is called the Low-Cost Pilot Program (http://agrivita.ca/program/lowcost.php)

Figure 2: PAMI recruitment poster



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1. Statistics Canada (2011). 2011 Census of Agriculture. Retrieved from: http://www.statcan.gc.ca/eng/ca2011/index
2. Canadian Agricultural Injury Reporting (CAIR). (2011). Agricultural fatalities in Canada from 1990-2008. A summary of 19 years of injury data. Winnipeg, Manitoba. Retrieved from: http: www.cair-sbac.ca
3. Canadian Centre for Health and Safety in Agriculture (2016). The Economics of Rollover Protective Structures. CANFARMSAFE. KM 15-03-006. Retrieved from: http://www.agrivita.ca/articles/15-03-006.php
4. Government of Newfoundland and Labrador (2012). Occupational Health and Safety Act. Filed January 17, 2012. Retrieved from http://www.assembly.nl.ca/legislation/sr/regulations/rc120005.htm

APPENDIX C

Overview of Agricultural Safety Training Resources

Canadian Centre for Health and Safety in Agriculture (CCHSA) offers multiple health and safety resources to farmers available electronically, which can be ordered in the printed format. At the Network's website there are presentations on chemical safety, children's safety, livestock, machinery, noise and respiratory health. Additionally the site offers three safety videos on low-stress cattle handling for productivity and safety, on sleepless and on respiratory health.
Website: http://aghealth.usask.ca/resources/resources-by-theme.php

The Canadian Agricultural Safety Association (CASA) offers training materials and courses for farmers across Canada. They offer over 200 online courses or training materials available for purchase on their website on topics from Accident Awareness to Chainsaw Safety to First Aid and WHIMIS.
Website: http://www.bistrainer.com/index.cfm?action=store.viewall&category=314

WorkSafe BC offers employer training videos on critical elements of temporary foreign workers and the employers' responsibilities. Additionally the site offers two safety videos- on tractor rollovers and pesticide storage.
Website: https://www.worksafebc.com/en

Safe Manitoba and **PEI Federation of Agriculture** have free resources for agricultural workers, including temporary foreign workers (with offerings in both Spanish and Chinese). Additionally, Safe Manitoba has videos on sun protection, personal protective equipment, machinery hazards, animal safety, and bulletins and information sheets on a variety of topics including working alone, operating older tractors, confined spaces, and livestock handling. PEIFA also offers training sessions at a low cost, such as First Aid and CPR , Forklift, Confined Spaces, Tractor Safety, Fall Protection, WHMIS, Class 3A Driving Training, and Welding Safety. It is interesting to note that while Alberta Department of Jobs, Skills, Labour and Training doesn't offer anything particular to Agriculture, it does offer an e-learning program for employers and workers on Alberta OHS Legislation, helping them to understand its applicability.
Websites: http://safemanitoba.com/video-machinery **;** http://peifa.ca/farm-safety-videos/**.**

The Ontario Department of Labour offers health and safety information to agricultural workers, as well as publications on workers' rights, understanding the legislation, incident reporting, and farm safety plans. **Website:** http://www.labour.gov.on.ca/english/hs/topics/farming.php

Workplace, Safety, and Prevention Services Ontario offers free training for Temporary Foreign Workers employed in agriculture as well as training and e-learning courses for purchase on topics such as electrical hazards, turkey and broiler chicken safe working practices, new agriculture workers health and safety orientation, as well a farm safe workshop. The factsheets offered for Temporary Foreign Workers would also be of benefit to general farm workers, offering information on harvesting equipment, heat stress, musculoskeletal disorder prevention, ROPS, and sun exposure.
Website: http://www.wsps.ca/Farm-Safety-Training/Training.aspx

National Ag Safety Database (NASD), developed with funding from the National Institute of Occupational Safety and Health (NIOSH), offers multiple training resources including:

FARM-HAT The Farm/Agriculture/Rural Management –Hazard Analysis Tool, which provides customized information on hazards relevant to a specific agricultural operation.

Website: http://nasdonline.org/

AgriSafe is a U.S. national, non-profit membership organization that provides a variety of services to assist health and safety professionals associated with agriculture. They utilize innovative technology to deliver agricultural safety training by top experts in the field.
Website: http://www.agrisafe.org/

PennState Extension provides **Hazardous Occupations Safety Training in Agriculture (HOSTA**) resources. These include farm emergency response training and AgSafety4u: Online Ag Safety Course. The National Safe Tractor and Machinery Operation Program (NSTMOP) is primarily a training program for youth seeking employment in production agriculture.
Website: http://extension.psu.edu/business/ag-safety/youth-safety/nstmop

U.S. Agricultural Safety and Health Centre Videos are great for safety presentations, with topics such as: new hire orientation, new producers, and required safety training. Their online video series “Making Safety Come Alive” covers several themes including: tractor and machinery safety, ladder injuries, dairy stockmanship and safety, livestock safety, forestry and logging, needlestick prevention, grain safety, pesticide safety, hearing protection, respiratory protection, heat illness, and child development.
Website: www.youtube.com/usagcenters