

MEETING THE CHALLENGES OF CLIMATE CHANGE


C-CIARN AGRICULTURE

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Summary Report for C -CIARN Agriculture and C-CIARN Prairies Roundtable session
at *Grain World* 2003, Fairmont Hotel, Winnipeg Manitoba, February 25, 2003

Canada 

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of GUELPH

Foreword

C-CIARN Agriculture (Canadian Climate Impacts and Adaptation Research Network for Agriculture) is housed at the University of Guelph and is part of a national effort to facilitate and promote research into climate change impacts, vulnerabilities, risks, and adaptation. In keeping with our mandate to engage stakeholders from the research, policy, and agricultural communities, C-CIARN Agriculture organizes and sponsors different types of meetings throughout the year. For 2003, our advisory committee (see Appendix A) chose to work with C-CIARN Prairies and the Canadian Wheat Board (CWB). We joined the CWB and at least twenty-five additional sponsors connected to the Canadian Agri-Food Sector, for the final day of their major agricultural conference, **Grain World 2003**. C-CIARN Agriculture and Prairies organized a roundtable session entitled *How Producers Meet Challenges from Climate Change*, which took place on February 25th from 2-5 pm. It was the closing session for the larger conference. Featured were presentations from seven Canadian producers who described their experiences with:

- climate/weather related risks and opportunities for their farm operation;
- modifications in practices or investments that have proved useful for dealing with such risks and opportunities;
- costs/benefits of implementation.

This report documents the highlights of the roundtable presentations and the discussion/question period following.

We are grateful for support from the Government of Canada, the Centre for Forest Interdisciplinary Research (University of Winnipeg), and the Faculty of Environmental Sciences and Department of Geography, (University of Guelph). Thanks are also due in large measure to the Canadian Wheat Board and their conference personnel who accommodated us in their event. Irene Hanuta (University of Winnipeg), Ellen Klupfel (University of Guelph), and Pauline Achola (University of Guelph) were very helpful with organizational details. Additional and sincere thanks go to the seven producers who took time from their busy schedules to make our roundtable session such a success.

Ellen Wall Co-ordinator, C-CIARN Agriculture
Barry Smit, Scientific Director, C-CIARN Agriculture
Dave Sauchyn, Coordinator, C-CIARN Prairies
Malcolm Wilson Scientific Director, C-CIARN Prairies

April 8, 2003

MEETING CHALLENGES FROM CLIMATE CHANGE

1. INTRODUCTION

The goal for the 2003 meeting sponsored by C-CIARN Agriculture and Prairies was to learn how producers meet challenges from climate change risks to their farm operations. We also wanted to share that information as widely as possible with those from agricultural, policy, and research communities. A cross-section of producers described their experiences in a relatively informal setting that encouraged questions and discussion.

To increase the agri-food sector’s awareness of C-CIARN Agriculture and Prairies, our meeting was held in conjunction with an existing agricultural conference. The opportunity to collaborate with the Canadian Wheat Board (CWB) in conjunction with their annual Grain World Conference (see Appendix “B”) arose through our National Advisory Committee. In December, 2002 we accepted CWB’s offer to use the conference facilities for the “follow-on” seminar spot in their three day program.

Grain World conferences focus on “outlooks” for the coming year and traditionally feature one plenary speaker on weather outlooks and issues. C-CIARN Agriculture provided such a speaker for 2003 with our Scientific Director, Prof. Barry Smit giving a talk entitled “Climate Change: So What for Agriculture”? This set the stage for the roundtable session, which followed— *How Producers Meet Challenges from Climate Change*.

Participants came from two groups, those who signed up through C-CIARN Agriculture and Prairies connections (see Appendix “D”) and those who came as part of their Grain World 2003 conference registration. Invitations for the session were posted on the web site for Grain World and C-CIARN Agriculture. Approximately ninety people came to the session as described in Table 1.

Table 1. Attendance at “*How Producers Meet Challenges from Climate Change*” through C-CIARN Agriculture and Prairies

Stakeholder group	Percentage
Industry	33
Policy	29
Research	38

Because the meeting was held in Winnipeg, the majority attending came from the prairies and Western Canada (75 per cent). The remaining 25 per cent traveled in from New Brunswick, Quebec, and Ontario.

The balance of this report is divided into four sections. The first part briefly describes those producers who participated in the roundtable presentations. The second section reviews their experiences with meeting the challenges of climate change. A third part concludes the report and is followed by appendices.

2. ROUNDTABLE PARTICIPANTS

Seven producers who have demonstrated innovative responses to risks from climate and weather conditions gave presentations on February 25th.

2.1. Wyatt Swanson, Provost Alberta

Wyatt Swanson and his family have farmed in Alberta for three generations. His parents never knew a crop failure in their years of operation. For Wyatt, the situation has been quite different as he could see the 1990s getting progressively drier and his grain operation suffering the consequences. Over a 15 year period he gradually altered his farm from 100 per cent grain production to 100 per cent cattle. The primary driving force has been the change in climate and weather conditions. Now Wyatt and his family have a completely closed drought-resistant system based on intensively grazing his more than 1100 head cow herd. Additional benefits have come from:

- not having to purchase fertilizer while increasing beef production;
- enhancing soil quality with forages and creating a potential for selling carbon credits;
- diversifying into trucking investments and developing new technology to operate his system.

2.2. Barry Routledge, Lenore Manitoba

Barry and his family run a 3000 acre very mixed farm that has become more diversified due in part to the demands from climate/weather conditions and land base. Part of the business includes a 600 head cow-calf operation, complemented by grain and oilseeds production. Barry has had a long and close involvement with the Manitoba Crop Insurance, serving on several related committees. For him, using crop insurance and related services is necessary to ensure a relatively smooth transition to future farm operations which will become increasingly diversified away from solid wheat production. Such developments also require more research into topics besides grains. He would like to see work completed on forages, crop mixtures and general adaptation options so that producers are in a strong position to take advantage of opportunities and meet risks from climate change and other factors.

2.3. Michelle McMechan, Lyleton, Manitoba

Michelle and her family operate a mixed farm with 1700 acres of crop and 1000 acres of pasture. Located on the western edge of the Lyleton ShelterBelt in southern Manitoba, their property has very sandy soil where erosion has been a persistent problem. The Lyleton ShelterBelt was started in the 1930s with support from a program with the Prairie

Farm Rehabilitation Administration. The program lasted in to the late 1950s and resulted in more than two million trees being planted. McMechan's farm has 17 miles of multi-rowed shelter belts that are proving very useful for stresses from climate and weather conditions. In addition, the use of rotational grazing, no-till, and the re-establishment of prairie native grasses are also helping to ensure the viability of their farming operation.

2.4. Debbie McMechan, Pierson, Manitoba

Debbie and her family's farm is situated on the eastern edge of the Palliser's Triangle, a region synonymous with drought and adverse weather conditions. They farm a total of 3200 acres, 2000 cultivated acres, and 1250 devoted to pasture and hay land. Once growing only wheat, barley and sunflowers, they now have converted to winter wheat, rye, oats, peas and canola as well as livestock. In the late 1990s, a North Dakota range scientist set up an experiment in rotational grazing on native grasses on their farm. The positive results have influenced how the McMechan's now run their operation. Native grasses respond positively to being grazed at precise time periods and can thereby withstand extended drought. Positive results in terms of animal health and weight gain have convinced them to continue with the current system and promote the techniques to other farm operators.

2.5. Brett Meinert, Shaunavon, Saskatchewan

Brett and his family are farming a 6000 acre cereal, pulse and oilseed farm in southwest Saskatchewan, where conditions are sem-arid and challenging. In recent years, climate and weather conditions have presented serious risks to their operation and have led them to adapt different strategies. Noting that farm decisions are always based on several factors at once, Brett described how the mindset for farming has to change if operations are going to be viable. The increase in uncertainty makes it exceedingly difficult to plan. They now insure that a single weather event will not devastate their production by having a range of crops and varieties, planted and harvested at different times. Adequate insurance coverage, enhanced soil conservation and personal determination are among the strategies Brett and his family are using to meet risks from all factors including climate change.

2.6. Larry Davis, Burford, Ontario

Larry and his family own a dairy farm in southwestern Ontario as well as a cash crop operation for wheat, corn, soybeans, and alfalfa. Climate and weather conditions have increased stress on water quality and quantity in his region. Experience with minimum and no till management on the land convinced him that those practices are good for both drought and flood conditions. If soil and water are respected they will return dividends for farm production despite adverse climate and weather conditions. At the community level Larry works with other producers on a proactive project, supported with government funding, that encourages more effective irrigation practices. Their success in one county has attracted the interest of others in similar circumstances. Increasing

pressures from drought and the need for economically efficient production will likely mean more producers wanting to get involved.

2.7. Ian Wishart, Portage La Prairie, Manitoba

Ian farms with his family on a highly diverse 3000 acre property that includes a cow-calf operation, feed lot, potatoes, soybeans, and forages for own use and exporting. Climate is one of many factors for decision-making. Their issues are less with drought and more with an over-supply of moisture. Ian has implemented many environmentally responsible practices that result in good risk management for climate and weather factors. Shelterbelts, some conservation tillage, efficient irrigation use and diversifying the operation have helped meet some recent challenges, even though these practices can have a number of drawbacks. Using crop insurance is definitely part of his strategy as a producer but it must not be relied on as a long term solution.

Each of these roundtable participants made a brief presentation on their experience and insights related to meeting challenges from climate change, elaborating some points in the discussion following at the end of the session. Details about their adaptation responses are included in the next section.

3. CLIMATE CHANGE RISK MANAGEMENT PRACTICES

Producers in many regions of Canada state that drought, flooding, extreme temperatures, and violent storms have increased risks for their farming operations. Producers in the C-CIARN Agriculture and Prairies roundtable session confirmed the importance of these climate/weather conditions. They also noted (as do many producers in other regions) that an extended growing season and more heat units have provided some benefits.

Each risk has a set of management strategies that are useful for reducing negative impacts. Climate change adaptation literature identifies a number of options available for producers and others in the agri-food sector for their decision-making about climate change risks. (See Appendix “C” for a full listing.) Two types of options are directly related to farm management:

- Farm Production Practices** including the use of diverse crop and livestock types and varieties; alternative tillage practices; implementation and/or improvement of irrigation systems; and effective land and water resource management.
- Farm Financial Management** referring to modifications in crop insurance use; the investment in crop shares and futures; participation in income stabilization programs; and diversifying sources of farm household income.

Producers in the C-CIARN Agriculture and Prairies roundtable gave details on how managing for climate change risks and opportunities fits into their overall farm planning

and decision-making. All agreed that climate change is one of several factors they have to consider for ensuring their economic viability. Table 2 summarizes details from producers' presentations by categorizing them in terms of the type of option implemented.

Table 2: Summary of how producers meet the challenges from climate change	
Option Type	Strategy followed
Farm Production Practices	<p>Diversify crops</p> <ul style="list-style-type: none"> • More perennial crops (eg. forages) are grown, thus improving drought tolerance by enhancing soil quality and moisture retention • Where possible, some producers are re-introducing native grasses for pasturing. These grasses are drought resistant when rotational grazing is practiced on them. • Many prairie producers are moving away from solid wheat production and growing a wide variety of new crops (eg. pulses) that are more drought resistant. • A diversity of crop types and varieties are grown in rotation and in different areas of farm properties. This spreads the risk of losing an entire year's production since conditions can vary across fairly small areas and different crops vary in how they respond to those conditions. • When possible, some producers also stagger their seeding and therefore harvesting dates by choosing a variety of crops that require a range of growing conditions so that crops are at different stages (and therefore more or less vulnerable) if and when climate/weather conditions start having a negative impact. <p>Diversify enterprises within one farming operation</p> <ul style="list-style-type: none"> • Many producers are including more livestock in their operations to make use of increased forage production and to add value on the farm. <p>Land Resource Management</p> <ul style="list-style-type: none"> • Conservation tillage practices were cited by all producers as having several positive outcomes for reducing risks from drought. These include: reducing soil erosion; enhancing moisture retention; and minimizing soil impaction. • Conservation tillage is also credited with limiting damage from run off and wash outs during flooding. • Some producers are enhancing established shelterbelts and/or adding new ones. This can reduce negative impacts from drought by maintaining water tables, increasing biomass in soil, and ensuring surface moisture is kept on the land. Shelterbelts also

	<p>provide protection from heat and wind for livestock, and can increase the heat units in adjacent fields.</p> <ul style="list-style-type: none"> • Some producers cut stubble at different heights to trap snow on field surfaces thereby enhancing spring moisture levels in the soil. <p>Water Resource Management</p> <ul style="list-style-type: none"> • The increase in drought conditions is leading to more interest in irrigation. Some producers are adopting newer, more efficient systems and timing for applications to avoid waste. • In some regions, community/producer worked out a system to share water resources equitably and encourage the use of highly efficient irrigation systems. Government financial support for implementing this strategy was an important factor in its success. • Water use in some dairy operations has been made more efficient with systems that re-cycle wastewater. • Sloughs and ponds are managed to ensure water is captured and protected as much as possible. <p>Livestock management</p> <ul style="list-style-type: none"> • Some producers who were affected by drought arranged to move some cattle out for winter feeding. • In some cases, intensive grazing leads to doubling the number of cattle on same acreage, increasing economic returns.
<p>Farm Financial Management</p>	<p>Insurance</p> <ul style="list-style-type: none"> • Producers agreed crop insurance is an important dimension to their farm financial planning. Some felt it should be used only for short term and not viewed as a permanent tool for adapting to risks. • Weather related insurance programs (hail for example) are needed more often, given the increase in risks from such weather conditions. • Many producers use crop insurance strategically. For instance it is useful to rely on it when going through a transition to a more diversified operation. However, crop insurance is lagging behind the diversified operations of today. For instance its applicability to forages is limited as are similar programs for livestock. <p>Diversify Farm Income</p> <ul style="list-style-type: none"> • Producers noted that they often had to innovate in order to make successful adaptations to risk. Some results have been marketable and led to an additional source of income for the farm household.

4. DISCUSSION

Successful adaptations, such as those described in Table 2, require support from the wider agri-food sector, including provincial and federal governments. For example,

- government and industry partnerships in programs aimed at improving water and land resource management play an important role in promoting strategies to limit climate change risks;
- federal and provincial government support is fundamental to viable income stabilization, disaster relief, and crop insurance programs;
- agri-businesses and governments are involved with technological developments in crop varieties and hybrids, irrigation systems, livestock facilities, and climate information systems;
- private insurance plans can offer additional coverage for climate change risks.

Many research issues are associated with these examples and the options listed in Table 2, yet little work has been completed on documenting, analyzing, and evaluating the effectiveness of such climate change risk management strategies. More information from producers like those involved in the C-CIARN Agriculture and Prairies session needs to be incorporated into climate change risk studies. The result will be more effective climate change risk adaptation policies and programs, a sound basis for communicating options to other producers, and a more sustainable agri-food sector.¹



¹ Photographs used in this report are from Manitoba Habitat Heritage Corporation, West Souris River Conservation District, and McMechan family collections.

“I view climate change as a challenge, but a challenge with lots of opportunities. What we need is not for someone to tell us what we’re going to do but rather for the researchers, academia, extension, and programs to provide us with the tools to allow us to adapt and achieve those very opportunities” (Barry Routledge)

“ We changed our operation from 100 per cent grain to 100 per cent cattle due mainly to climate..we remained in farming by adapting to climate change” (Wyett Swanson)

“Our cattle weights over the last four years show that twice over rotational grazing has resulted in more net pounds of beef...As cattle producers we have found that [our system] is the most effective management practice to offset drought.” (Debbie McMechan)

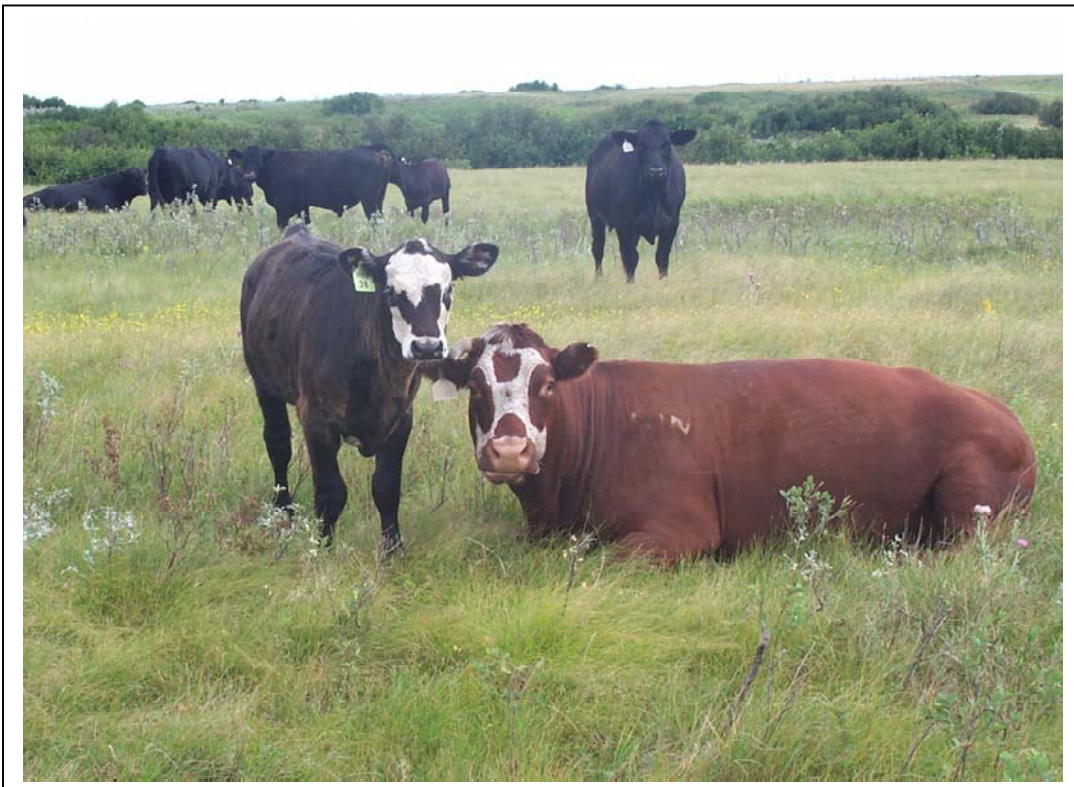
“My systems have been designed to improve reliability of production on a whole farm basis, I may have a disaster in my field peas but my durham is fine. What I am really trying to really do is make crop insurance yield protection...irrelevant. While I carry crop insurance on my dominant wheat crop, I consider the extreme weather happenings to be the most important insurable events...” (Brett Meinert)



“as we have indicated here today, all those who are farmers... we have to adapt to climate change and face the opportunities and challenges that are presented ; we have to treat our soil and water with the respect they deserve; if we manage our soil so it has the ability to deal with adverse weather—being either too wet or too dry then we can use what mother nature gives us” (Larry Davis)

*“We find we grow our best corn crops between the shelterbelts on 19-1-28...In the winter our trees hold the snow on the land thereby increasing soils moisture in the spring...During the summer months the wind reduction from the trees results in less moisture loss due to evaporation and provides protections from emerging crops.”
(Michele McMechan)*

“Climate change is part of almost every decision that we make on the farm but it is not the sole driving factor...on most operations if you take climate change into consideration you are going to have to do one of two things. You’re going to tighten your belt and keep on doing what it is you have been doing for a long period of time or you’re going to have to deal with the problem and adapt and survive in that way..that is the approach we are going to have to take...” (Ian Wishart)



Appendix “A”

C-CIARN AGRICULTURE

NATIONAL ADVISORY COMMITTEE MEMBERSHIP 2002

Name	Organization
Geri Kamenz	Canadian Federation of Agriculture and Ontario Federation of Agriculture
Bruce Burnett	Canadian Wheat Board
Don McCabe	Grain Growers of Canada and Ontario Corn Producers' Association
Gordon Fairchild	Eastern Canada Soil and Water Conservation Centre
Brian Abrahamsom	Prairie Farm Rehabilitation Association
Bob MacGregor	Agriculture and Agri-Food Canada
Nancy Lease	Le ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec
Mike Goss	Canadian Agri-Food Research Council and University of Guelph
Dave Sauchyn	Prairie Adaptation Research Collaborative
Chris Bryant	Université de Montréal
Rob Gordon	Nova Scotia Agricultural College

LOCAL STEERING COMMITTEE (Guelph)

Tony Hunt (Plant Agriculture, University of Guelph)
 Terry Gillespie (Land Resource Science, University of Guelph)
 Alfons Weersink (Agricultural Economics and Business, University of Guelph)
 Oswald Zachariah (Ontario Ministry of Agriculture and Food)

[Ellen Wall](#) Coordinator/Manager
[Barry Smit](#) Scientific Director
[Ellen Klupfel](#) Graduate Research Assistant

Appendix “B” **GrainWorld 2003**

GrainWorld 2003 will be held at The Fairmont Hotel in Winnipeg, February 23-25, 2003. It will begin with an opening reception on the evening of Sunday, February 23, 2003, followed by a day and a half of working sessions on Monday, February 24, and Tuesday, February 25. It will conclude with a closing luncheon on the afternoon of Tuesday, February 25.

GrainWorld, now entering its twelfth year, is an annual two-day Canadian agricultural outlook conference held every year in late February in Winnipeg, focusing on the market outlook for grains, oilseeds, special crops (pulses, canaryseed, mustardseed, etc.) and red meats (cattle and hogs; beef and pork) in the upcoming year. It is jointly sponsored by the Canadian Wheat Board (CWB), Agriculture and Agri-Food Canada, the departments of agriculture of the three Prairie provinces, and the rest of the Canadian grain and grain-processing industries and the Canadian livestock industry. It has a restricted attendance of about 300 which sells out every year to senior-level people from the Canadian and international grain and livestock industries, U.S., Canadian, and other countries’ government officials involved in agriculture, and farm leaders. The conference is well-covered every year by the Canadian and international media.

The purpose of the annual *GrainWorld* conference is threefold: to provide expert perspectives and an opportunity for industry discussion on the market outlook for the upcoming marketing year for the commodities covered (wheat, coarse grains, barley, oilseeds, special crops, red meats); to provide the opportunity for discussion of topical international and domestic agricultural sector issues and other international and domestic issues; and to permit agricultural sector decision-makers to become acquainted with one another or renew acquaintances in informal discussions during conference breaks.

The core content of the *GrainWorld* conference is therefore -- as might be expected -- the market outlook sessions for the commodities covered. Beyond these, however, the conference also includes every year some “special-topic” speakers or panels on special topics. In the recent past these have ranged from the prospects for the World Trade Organization negotiations on agriculture to new visions for agriculture on the Prairies and the Great Plains of North America to developments in the agricultural sectors of the former Soviet republics. In addition, we always have two or more thought-provoking keynote luncheon or banquet speakers not necessarily from the grain industry or even from the agricultural sector itself. To provide some relief from the pure business content of most of the conference subject matter, there is also some entertainment at the Sunday evening reception and at the Monday evening banquet.

Brian White, Vice-President
Commodity Analysis and Risk Management
Canadian Wheat Board
And Conference Chairman
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HOW PRODUCERS MEET CHALLENGES FROM CLIMATE CHANGE

*February 25, 2003; 2:00-5:00 pm
West Ballroom, Fairmont Hotel, Winnipeg, Manitoba*

**Ellen Wall (C-CIARN Agriculture) Dave Sauchyn (C-CIARN Prairies)
Welcome and introduction for the roundtable**

**Wyett Swanson
Alberta-Livestock/grazing**

**Barry Routledge
Manitoba-Crop insurance**

**Debbie and Michelle McMechan
Manitoba-Shelterbelts, native grasses, conservation tillage**

**Brett Meinert
Saskatchewan-New crops/soil management**

**Larry Davis
Ontario-Sharing water in rural communities**

**Ian Wishart (TBC)
Manitoba-Crop insurance**

**Discussion
Dave Sauchyn, moderator**

**Barry Smit (C-CIARN Agriculture)
Wrap up**

C-CIARN AGRICULTURE

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Appendix “C”

Main Types and Selected Examples of Adaptation Options in Canadian Agriculture²

<p><u>TECHNOLOGICAL DEVELOPMENTS</u></p> <p>Crop Development ☛ Develop new crop varieties, including hybrids, to increase the tolerance and suitability of plants to temperature, moisture and other relevant climatic conditions.</p> <p>Weather and Climate Information Systems ☛ Develop early warning systems that provide daily weather predictions and seasonal forecasts.</p> <p>Resource Management Innovations ☛ Develop water management innovations, including irrigation, to address the risk of moisture deficiencies and increasing frequency of droughts. ☛ Develop farm-level resource management innovations to address the risk associated with changing temperature, moisture and other relevant climatic conditions.</p>
<p><u>GOVERNMENT PROGRAMS AND INSURANCE</u></p> <p>Agricultural Subsidy and Support Programs ☛ Modify crop insurance programs to influence farm-level risk management strategies with respect to climate-related loss of crop yields. ☛ Change investment in established income stabilization programs to influence farm-level risk management strategies with respect to climate-related income loss. ☛ Modify subsidy, support and incentive programs to influence farm-level production practices and financial management. ☛ Change <i>ad hoc</i> compensation and assistance programs to share publicly the risk of farm-level income loss associated with disasters and extreme events.</p> <p>Private Insurance ☛ Develop private insurance to reduce climate-related risks to farm-level production, infrastructure and income.</p> <p>Resource Management Programs ☛ Develop and implement policies and programs to influence farm-level land and water resource use and management practices in light of changing climate conditions.</p>
<p><u>FARM PRODUCTION PRACTICES</u></p> <p>Farm Production ☛ Diversify crop types and varieties, including crop substitution, to address the environmental variations and economic risks associated with climate change. ☛ Diversify livestock types and varieties to address the environmental variations and economic risks associated with climate change. ☛ Change the intensification of production to address the environmental variations and economic risks associated with climate change.</p> <p>Land Use ☛ Change the location of crop and livestock production to address the environmental variations and economic risks associated with climate change. ☛ Use alternative fallow and tillage practices to address climate change-related moisture and nutrient deficiencies.</p> <p>Land Topography ☛ Change land topography to address the moisture deficiencies associated with climate change and reduce the risk of farm land degradation.</p> <p>Irrigation ☛ Implement irrigation practices to address the moisture deficiencies associated with climate change and reduce the risk of income loss due to recurring drought.</p> <p>Timing of Operations ☛ Change timing of farm operations to address the changing duration of growing seasons and associated changes in temperature and moisture.</p>
<p><u>FARM FINANCIAL MANAGEMENT</u></p> <p>Crop Insurance ☛ Purchase crop insurance to reduce the risks of climate-related income loss.</p> <p>Crop Shares and Futures ☛ Invest in crop shares and futures to reduce the risks of climate-related income loss.</p> <p>Income Stabilization Programs ☛ Participate in income stabilization programs to reduce the risk of income loss due to changing climate conditions and variability.</p> <p>Household Income ☛ Diversify source of household income in order to address the risk of climate-related income loss.</p>

² From Smit, B. and M. Skinner, 2002. Adaptation options in Agriculture to Climate Change: A Typology. *Mitigation and Adaptation Strategies for Global Change* 7:85-114.

Appendix “D”

**List of Roundtable Attendees registered through
C-CIARN Agriculture and Prairies**

Last Name, First Name	Affiliation
Abrahamson, Brian	PFRA, Regina, Saskatchewan
Afflick, Lloyd	Sask Pulse Growers
Ash, Guy	Canadian Wheat Board
Barg, Stephan	International Institute for Sustainable Development, Winnipeg, Manitoba
Beesley, Ken	University of Brandon, Brandon, Manitoba
Bryant Chris	University of Montreal, Montreal, Quebec
Bullock, Paul	University of Manitoba, Winnipeg, Manitoba
Burnett, Bruce	Canadian Wheat Board
Campbell, Glen	West Souris River Conservation District, Reston, Manitoba
Campbell, Judy	West Souris River Conservation District, Reston, Manitoba
Cunningham, Dennis	International Institute for Sustainable Development, Winnipeg, Manitoba
Davis, Larry	Brant County, Ontario
Duggan, Jennifer	Climate Change Connection, Winnipeg, Manitoba
Edie, Ken	Producer, Dugald Manitoba
Garr Mary Lou	Ontario Federation of Agriculture, Niagara, Ontario
Gosselin, Wayne	Saskatchewan Industry and Resources, Regina, Saskatchewan
Hanuta, Irene	University of Manitoba, Winnipeg, Manitoba
Hood, James	Manitoba Agriculture and Food, Brandon, Manitoba
Hucq, Andre	University of Saskatchewan, Saskatoon, Saskatchewan
Klupfel, Ellen	University of Guelph, Guelph, Ontario
Lease, Nancy	Le ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec
McCabe Don	Grain Growers of Canada
McMechan, Michelle	Lyleton, Manitoba
McMechan, Debbie	Stoney Acres Farm, Pierson, Manitoba
Mehta Michael	University of Saskatchewan, Saskatoon, Saskatchewan
Meinert, Brett	Meinert Enterprises Ltd., Shaunavon, Saskatchewan
Mrena, Chuck	University of Manitoba, Winnipeg, Manitoba
Mou, Cathy	Manitoba Energy, Science and Technology, Winnipeg, Manitoba
Moulin Alan	Agriculture and Agri-Food Canada, Brandon, Manitoba
Neilson, David	Alberta Agriculture, Food and Rural Development, Edmonton, Alberta
Neudoerffer, Cynthia	University of Guelph, Guelph, Ontario
Nichols Ian	Ontario Weather Network, Ridgetown, Ontario
Raddatz, Rick	Meteorological Service of Canada, Winnipeg, Manitoba
Ramsey, Doug	University of Brandon, Brandon, Manitoba
Reid, Susanna	University of Guelph, Guelph, Ontario
Routledge, Barry	Lenore, Manitoba
Sauchyn, Dave	University of Regina, Regina, Saskatchewan
Sawyer, Bronwyn	Simon Fraser University, Burnaby, British Columbia
Smit, Barry	University of Guelph, Guelph, Ontario
Svistovski Frank	Environment Canada, Winnipeg, Manitoba
Swanson, Wyatt	Provost, Alberta
Taylor, Eric	C-CIARN Ottawa, Ontario
Tyrchniewicz, Allen	Tyrchniewicz Consulting, Winnipeg, Manitoba
Tyrchniewicz, Ed	Agrology Institute of Canada, Winnipeg, Manitoba
Venema, Henry	International Institute for Sustainable Development, Winnipeg, Manitoba
Wall, Ellen	University of Guelph, Guelph, Ontario
Wang, Sushen	Canada Centre for Remote Sensing, Ottawa, Ontario
Weersink, Alfons	University of Guelph, Guelph, Ontario
Wishart, Ian	Manitoba
Yusishen, Bryan	Manitoba Ministry of Agriculture, Portage la Prairie, Manitoba
Zachariah Oswald	Ontario Ministry of Agriculture and Food, Guelph, Ontario
Zdan, Terry	Manitoba Ministry of Transportation and Government Services

