



FARM MANAGEMENT CANADA
GESTION AGRICOLE DU CANADA

Seeds of Change

Shifting Diets & Soil Carbon Sequestration Markets:
How Climate Change is Driving New Opportunities
and Risks in Agriculture

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Executive Summary

Climate Change is driving change on Canadian farms and ranches at an increasingly rapid pace, introducing new opportunities and risks that were unanticipated just a few years ago. Traditional forecasting methods fail when the future looks nothing like the past. How best then, to manage risk when faced with this kind of uncertainty? Farm Management Canada's *Roots to Success* project responded to this challenge by undertaking a foresight exercise focused on farms and ranches.

Weak signals or seeds of change are defined in foresight analysis as the first indicators of change that may become significant in the future.¹ Members of Farm Management Canada's National Risk Management Roundtable participated in a horizon scan exercise that identified 8 weak signals driven by climate change. Two of these signals were identified as priorities by Roundtable members:

- Canadians are shifting their diet to include more fruit, vegetables and non-animal protein alternatives (for both health and environmental reasons); and
- Soil carbon sequestration markets will become an opportunity for the agriculture sector.

Each of the priority signals were then used to build future scenarios that indicate potential outcomes should the signal become the norm. Resulting opportunities and risks to farmers and ranchers were then identified, along with recommendations for support strategies that Farm Management Canada and government can provide.

Plant-Based Diets

It is clear Canadians (and Americans) are shifting their diets to include more plant-based food at an ever-increasing pace. Should the majority of Canadian's significantly shift their diets in this direction, resulting impacts are consequential and far-reaching for farmers, ranchers, governments, and other food industry stakeholders. A key driver of this shift in behavior is the consumer's concern for the environment, and more specifically climate change. Yet, the scenario mapping exercise indicated that adopting a more plant-based diet does not necessarily result in lower GHG emissions. There are a range of opposing impacts and opportunities that will need to be managed to ensure climate-friendly outcomes.

For instance, vertical farms and greenhouses will need to be powered by renewable energy and located close to, or within cities, if transport/logistic related emissions are to be reduced. However, there are still provinces and territories in Canada where traditional fuels are used to power the grid. There are also examples of large greenhouse operations located remotely from major urban centers. Consumer demand for fresh fruit and vegetables in a country that experiences winter for half the year will drive imports even further. Promoting local production and ensuring refrigerants used in "cold chains"¹ are managed to minimize GHG emissions are some of the counter measures required. While farmers may be interested in increasing the production of high value fruits, vegetables and pulses, current regulations may not ensure the optimal allocation of horticultural land. These are a few examples of the challenges identified in this report.

¹ Definition: A cold chain is a low temperature-controlled supply chain. See [here](#) for more information.

Interestingly, the plant-based diet scenario does not spell doom and gloom for the livestock industry. Canadians are unlikely to eliminate meat from their diets. They are, however, more likely to become increasingly discerning consumers. This means buying less meat, but of a higher quality and raised more sustainably. There will also be an increased focus on exporting livestock and meat, requiring further investments in logistics, transportation, and international marketing of high-quality Canadian products.

Scenarios developed for plant-based diets suggest that government and other key stakeholders will need to take this trend very seriously. It will be important to identify and prioritize which response measures need to be taken soon for Canadian agriculture to manage the new risks and capitalize on the opportunities associated with this shift in behaviour.

Soil Sequestration Markets

Soil sequestration markets face a number of challenges on the road to becoming established. However, there is good reason to believe that they will emerge as part of a broader set of sequestration/GHG emission reduction opportunities for farmers and ranchers. Interestingly, this scenario demonstrated the link between establishing these markets, the need to establish 5G networks in rural areas, and how data will play an ever-increasing role in farm and ranch management. Not only will soil carbon sequestration improve soil health and productivity; it will also demonstrate that reforesting marginal lands can bring alternative sources of revenue and benefits.

Government will need to play a central role in minimizing the risk to farmers and ranchers of entering these emerging markets. This will include supporting transparency measures related to pricing, identification of credible third-party regulators, and providing insurance to cover instances where carbon sequestration is lost. Taking early action on these points will encourage early entrants and help to avoid failures from poor implementation.

The Link Between Both Scenarios

Both scenarios show that regenerative agriculture practices will likely increase as these seeds of change become established norms. This will drive shifts in how farming is practiced in Canada and require further support by government agencies and Farm Management Canada. There is a real need to provide guidance to different types of farm/ranch operations on what measures can be taken, associated risks to be managed, and potential returns. Regenerative agriculture practices will also promote connections between farms and other local businesses, driving circular economic practices. Sunk costs in expensive farming equipment represent a potential obstacle and opportunity for some farmers interested in changing operations. It also represents an opportunity for entrepreneurs to find innovative ways to retrofit machinery for other uses. Policy makers and Farm Management Canada are well placed to help farmers and ranchers understand and adopt these practices.

Key Recommendations

While this report provides a detailed, extensive list of recommendations for both government and Farm Management Canada, the following recommendations have been highlighted as key factors in contributing to meeting Canada's climate change goals.

Government

The shift towards more plant-based diets will challenge Canada's ability to meet its GHG commitments. Recommendations for government agencies include ensuring policy, regulations, infrastructure, support and/or incentive programs are developed to:

- Phase out the use of Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and other substances used in refrigeration, air conditioners and fire suppressants responsible for direct fugitive emissions. These are associated with "cold chains" transporting fruit and vegetables.²
- Limit GHG emissions associated with transport/logistics resulting from cross-border imports. This can help reduce waiting time at borders, etc.
- Power greenhouses and vertical farms from non-GHG emitting power sources.
- Target new farmers entering the greenhouse/vertical farming space. These individuals tend to come from highly technical backgrounds (engineering, IT, biotech disciplines) and will likely not be reached through traditional channels.
- Support watershed management and precision irrigation in areas where competition for water from competing land uses is high.
- Ensure regulations are updated to support the optimal allocation of horticultural land.
- Support GHG emissions monitoring, reporting and transparency along supply chains

The scenario developed for soil carbon sequestration markets underscores the reality that this shift will require ensuring 5G connectivity in rural areas thereby enabling precision agriculture and big data applications on farms.³ Key recommendations for government include ensuring policy, regulations, infrastructure and incentive programs are developed to:

- Reach remote rural areas with robust 5G coverage to support data collection, analysis, reporting and verification.
- Provide timely, accurate, readily available information to farmers and ranchers regarding market prices and aggregators for soil carbon credits.
- Provide insurance schemes for instances when soil carbon sequestration fails (this could include situations where land is bought from farmers and converted to other uses, or when natural disasters greatly affect soil profiles).
- Protect the digital privacy of farmers and ranchers.

Regenerative farming plays a key role in both scenarios. Government agencies will need to work with farmers to provide the research, incentives and guidelines that will help different farm and ranch systems convert operations while keeping new initiatives and processes accessible and efficient.

² Source: <https://www.epa.gov/sites/default/files/2015-07/documents/fugitiveemissions.pdf>

³ Source: <https://www.newswire.ca/news-releases/5g-has-positive-impacts-for-canadians-in-rural-and-urban-communities-848033601.html>

Farm Management Canada

The shift towards plant-based diets and the rise of carbon sequestration markets reveals opportunities for Farm Management Canada to develop and deliver programs and services, and conduct research, that provide Canada's farmers and ranchers with the knowledge, resources, and tools to manage change and seize the new opportunities that these two signals could provide for the agricultural sector. Key recommendations for Farm Management Canada include:

- Lead work on climate change risk management and business opportunities for farmers and ranchers.
- Continue to promote and support a comprehensive approach to managing risk in agriculture that acknowledges the connections between Canada's climate change goals and the risks and opportunities for farmers and ranchers.
- Continue to explore the connection between farm business management and climate change to identify existing and emerging risks and business opportunities for Canada's farmers and ranchers
- Expand on foresight techniques piloted in this report as a means of identifying potential risks and opportunities for farmers and ranchers.
- Help farmers and ranchers assess and apply regenerative farming practices to improve soil health and tap into soil carbon sequestration markets.
- Raise awareness amongst farmers and ranchers regarding the risks and opportunities that the shift to a plant-based diet may bring and provide relevant training on marketing opportunities that arise from these trends.
- Help farmers and ranchers explore and capitalize on the opportunities brought by 5G networks in rural areas to improve the business of farming and risk management. From improved forms of e-commerce to real time data collection and analysis, remote medical support,⁴ online training and mobile apps that farmers can use to support their work.
- Vertical farms and greenhouses are ushering in a new type of farmer. They come from biotech, engineering and IT backgrounds, and may not even consider themselves farmers in the traditional sense. It will be important for Farm Management Canada to develop new networks, supported by cutting edge IT applications if they are to engage this group. Engaging with this new group of farmers may also require hiring staff with new skill sets to support these operations.

One of the more revealing outcomes of the Seeds of Change exercise has been that there needs to be a shift in thinking and attitudes towards climate change in the agricultural sector. What is currently viewed as a risk or obligation that causes extra work or imposes costs for farmers and ranchers can also be an important opportunity. Shifts in climate drive extreme weather events and introduce new pests along with a suite of other risks for farms. However, agriculture will also benefit as new techniques and technologies improve productivity and efficiencies. Canadian agriculture can lead sustainability efforts, while benefitting economically from the programs that are being put in place to counter climate change. Farm Management Canada will need to work proactively in this space with its members to ensure the future of our farms and our country is bright.

⁴ Source: <https://www.theglobeandmail.com/featured-reports/article-how-5g-is-helping-to-connect-rural-communities/>