CAPI
THE CANADIAN AGRI-FOOD POLICY INSTITUTE

“Optimizing Land Use for Sustainable Growth” a CAPI Dialogue Calgary 2019

Dialogue Summary Report

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The Canadian Agri-Food Policy Institute

960 Carling Avenue, CEF

Building 49, Room 318

Ottawa, ON K1A 0C6

Telephone: 613-232-8008

Fax: 613-232-8008

www.capi-icpa.ca

Canada

I. INTRODUCTION

PREAMBLE

One of the most significant global challenges of the 21st century is producing enough affordable and accessible food to meet the demands of an increasing population, while maintaining and improving natural capital (land, water, air, biodiversity). As a result of three conversations held by CAPI in 2017-18, entitled "Barton Forward: Optimizing Growth," CAPI concluded that "…we will require more than "simple" growth to achieve the ambitious growth targets in the Barton Report. "Quality" growth is needed to ensure that the gains in the agri-food sector can be sustainable. Not ensuring that Canada's natural capital is being preserved at the same time could accelerate environmental degradation, resulting in losses in productivity and erosion of public trust, which would impede Canada's longer-term prospects."

In agricultural production, soil use and soil quality connect not only to farmers' choices among competing enterprises, such as crops versus livestock, but also to biodiversity, air and water quality and through carbon sequestration, and climate change. Farmers allocate their land to optimize economic returns. However, optimizing land use with a view to maintain and improve its productive capacity over the long term, while supporting the national carbon strategy, may require more than just responding to market signals. In this context, production and consumption of animal proteins such as beef, have become one of the more controversial and divisive issues related to the interaction of agriculture, natural capital, and the environment. The key question becomes "how can land use be optimized to improve environmental outcomes, while maintaining and improving the sector's long-term competitiveness and securing "quality" growth?"

To seek answers, CAPI and partners convened a dialogue on February 21-22, 2019 in Calgary, Alberta with the participation of a transdisciplinary group of experts from industry, government, academia and other research groups to commence a conversation on "Optimizing Land Use for Sustainable Growth." This CAPI Dialogue focussed specifically on land use choices, agronomic practices and policy instruments and their impacts on soil, air and biodiversity.

With 100 plus participants, the Dialogue was a great success, raising awareness about land use practices and their impacts on GHG emissions, air and water quality, and biodiversity as well as on sector profitability. Thanks to great discussion, participants developed a shared understanding of the options available to optimize land use for sustained growth and long-term competitiveness.
What's more, the level of this thought-provoking discourse was high and engaging, judging by the questions and comments from the floor and the full room until the event concluded. This CAPI Dialogue would not have been a success without great speakers and discussants who kept the participants engaged in this important conversation. A Summary of the "dialogue" is provided below. Each Session, which began with a presentation by an expert speaker, was followed by comments provided by several discussants, who provided their perspectives from an industry, farm-level, and off-farm point of view.

II. WHAT WE HEARD

SESSION 1: SETTING THE STAGE: MEASURING SUSTAINABLE GROWTH IN AGRICULTURE

The first Session of the Dialogue focussed on measuring sustainable growth in agriculture. **Dimitris Diakosavvas** from the Organization for Economic Cooperation and Development (OECD) provided a snapshot of Canada's progress with a series of green growth indicators relative to other OECD countries over time. he described the framework for measuring green growth, provided several key indicators related to productivity of natural capital, and economic opportunities and policy responses. Diakosavvas emphasized how important these indicators are for raising awareness, measuring progress and identifying potential opportunities and risks. However, it is sometimes hard to interpret results, and depending on the indicator, different stories can be told. Canada has made progress on a number of fronts, including GHG emission reductions from agriculture and R&D investments, but there is a need for further work around nutrient balances, energy and total factor productivity.

Ted Bilyea, CAPI Special Advisor, followed with a presentation on "Issues in Measuring Sustainability," drawing from recent work by EAT Lancet, the World Resources Institute, the FAO and the World Bank. He described examples of how data on GHG emissions in agriculture are being used to misinterpret what is really happening. For example, high GHG emissions per capita in New Zealand have been highlighted, despite its high GHG efficiency in production, as a result of this small (populated) country meeting the dairy demand of China. This raises the issue of where the emissions should be counted; in the producing country or where the products are consumed? Likewise, cattle emissions in Canada may be rising, but this is due to increasing production to feed a growing population. In summary, more relevant, transparent indicators of carbon and resource productivity are needed, that will be better for making international comparisons and for redefining the comparative advantage of countries. Canada, as a sustainable beef producer could play a role in disseminating its knowledge and technology throughout the world, which could make a huge impact on lowering global GHG emissions.

During the **open discussion session**, the participants emphasized the importance of good data and measurement. Three issues were identified:

- Canada has been successfully improving soil health through the use of zero/reduced till and adoption of 4R practices and precision agriculture, which needs to be verified with metrics and communicated to consumers for enhancing public trust and attracting investments.
- To do so, we need data at the regional level for benchmarking and measuring progress for branding Canadian products, such as sustainable beef, in world markets.
- Good data is also essential for identifying areas where improvement is needed for improved sustainability.

SESSION 2: PLANTS AND SOILS

Dr. Sean Smukler of the University of British Columbia (UBC) presented "Cropland management to improve soils capacity for increased C-sequestration and implications on environmental indicators." His research focused on the role of soil health and soil organic carbon for helping reduce CO_2 emissions and climate change. He described "4 per thousand," a world-wide initiative aimed at carbon storage targets for offsetting climate change. Moisture retention, carbon and nutrient storage and cycling for plants all improve soil health. Canadian farmers have made significant gains in improving soil health and carbon storage since the 1980s, through the adoption of Beneficial Management Practices (BMPs), such as reduced soil disturbance, no till and conservation till practices, cover crops and crop rotations. Other practices could be adopted to improve soil health as well, such as grassland set aside and planting hedgerows and agroforestry, which also benefit biodiversity. However, there are trade-offs and risks associated with these practices, that will impact manure management requirements and excess nitrogen and water pollution.

Smukler described the challenges associated with providing scientific guidance for BMPs and monitoring, reporting and verification. Farmers require incentives when implementing practices to improve soil health because there are costs involved that can impact their economic viability. He recommended coordinating efforts and collaboration between policy makers and farmers to build knowledge and disseminate it strategically.

The responses from the industry panel, which included **Cam Dahl, Susan Wood-Bohm** and **John Bennett**, brought forward the following issues:

- The importance of farmer-led innovations for the progress that has been made on soil health on the Prairies, which resulted in improved soil organic matter and moisture retention, made farmers more productive and resilient, to the extent that despite the drought-like conditions on the Prairies over the past two years, government support has not been necessary. Emerging innovations are helping the sector improve its ability to address climate change. In the past, plant breeding research focused on increasing yields. Now plant breeding research is addressing nitrogen use efficiency, productivity of photosynthesis, animal-plant systems, perennial production systems and microbiome. Research on biochar in soils is helping alter the basic structure of soils and improving carbon capture potential. Other innovations include the use of air seeders, smart spraying, sensors and precision agriculture, robotics and self-propelled weeders that could make herbicide use redundant.
- Two requirements for farmers to take full advantage of all these new technologies include: 1) the availability of resources for extension, to disseminate these new technologies and practices, and 2) market-based incentives for their adoption. This will require communicating the role farmers play in producing healthy and sustainable food.

SESSION 3: ANIMALS AND SOILS

Dr. Cameron Carlyle of the University of Alberta spoke on "The Benefits of Cattle for Carbon Storage and Biodiversity on the Prairies." He described the loss of native grasslands and biodiversity in the Canadian Prairies, due to substantial conversion to cropland. Cattle is essential for maintaining grasslands, which are important for providing forage, carbon storage, habitat for pollinators and wildlife. Grassland ecosystems can also help with water and moisture control. It is important to understand how stocking rates and the intensity of livestock grazing impact these pastures, including their role in improving the soil microbiome. There are not yet protocols for perennial vegetation and carbon offsets for perennial forage vegetation on grazing lands. It is important that more research is done to understand the ideal combination of landscapes and stocking rates for soil health, carbon storage and biodiversity and climate change as well as the interactions between crop and livestock production for sustainability.

The discussants **Brenna Grant, Jason Bradley,** and **Cherie Copithorne-Barnes** focused on industry initiatives and new innovations that are promoting research and addressing public trust. Drawing from the Canadian Cattlemen's Association's role in the Global Roundtable for Sustainable Beef, they stated:

- There are large differences in emission intensities in livestock production across countries, with Canada being one of the lowest emitters. Most of this improvement has come from improved breeding, feed efficiency and grazing management. Furthermore, new research on the application of new technologies such as AI and machine learning applied to pasture management, livestock management and soil information systems are anticipated to lead to increased productivity, profitability and sustainability.

- The Canadian Roundtable for Sustainable Beef (CRSB) is leading certification and verification of sustainable beef production that also adheres to animal welfare standards. A framework for sustainable production helps the Canadian beef industry improve the sustainability of its beef value chain through science, multi-stakeholder engagement, communication and collaboration, so that it can market its verified beef at home and abroad. However, these improvements have not been well communicated to consumers. Public trust is being impacted by the negative press related to beef production and climate change, as well as nutrition information and health outcomes. Thus, it is critical to communicate this information to consumers, effectively and transparently.

SESSION 4: CONNECTING WITH THE CONSUMER: HOW EVOLVING CONSUMER CHOICES WILL SHAPE FOOD PRODUCTION SYSTEMS AND LAND USE OPTIONS IN CANADA

During dinner, **John F. T. Scott**, the Chair of the CAPI Board of Directors and the Former Chair of the Canadian Federation of Independent Grocers, provided his insight into the retail food marketplace in Canada. John believes that food retailers should always be included in the discussion because they are closer to consumers and can identify trends and preferences more quickly that can be transmitted down the food supply chain to producers. Loyalty cards and programs have become important for retailers to understand what their customers want.

He spoke of the changes that have been taking place in the Canadian retail food industry, such as increasing on-line shopping, demand for sustainable, organic, non-GMO products and fresh produce, which now accounts for 35% of most grocery stores. Food retailers face very thin margins, increased consolidation and a very different marketplace than a decade ago. But as they continue to evolve with the times, information transmitted downstream to producers in the food value-chain and upstream to consumers ensures that the quality and nutritional value of the food they are selling continues to meet the needs of consumers and builds public trust.

SESSION 5: EXTERNALITIES AND POLICY INSTRUMENTS

Dr. Tristan Skolrud of the University of Saskatchewan spoke on "Sustainable Growth, environmental goods and services and market failures in agriculture." The OECD defines externalities as "the economic concept of uncompensated environmental effects of production and consumption that affect consumer utility and enterprise cost outside the market mechanism." This implies that the private costs of production of negative externalities tend to be lower than the social costs, implying overproduction of negative outcomes. Examples of negative externalities include GHG emissions, ammonia, particulate matter, nitrogen water pollution, soil erosion etc. Positive externalities or environmental goods and services (EG&S) include improved biodiversity habitat, landscape aesthetic and erosion control, as examples.

Skolrud provided many estimates of negative externalities from Canadian Prairie and Central Canada agriculture. Estimates of ammonia emissions from fertilizer application were valued at $437 million on the Prairies and $294 million in Central Canada. They are influenced by the amount of fertilizer that is applied versus the amount needed, the soil type, weather and crop choice. He also presented estimates of air pollution from Particulate Matter (PM) (i.e., microscopic particles that end up in the air as a result of land preparation, wind erosion, manure application, pollen from corn, and animal feeding operations). Estimates of the costs of PM are high-$2083 per tonne in rural areas and $6,247 per tonne in urban areas for a total externality cost of $4.2 billion. These estimates are high because they include the impact on human health, based on the value of a statistical life. The Prairie provinces tend to have higher negative externalities from PM. Estimates of negative externalities from GHG emissions in agriculture were also provided: $920 million for Canada as a whole.

Skolrud concluded that when it comes to developing policies to address these negative externalities, the most damaging externalities should be addressed first.

Professor G. Cornelis Van Kooten of the University of Victoria followed with a presentation on "Policy Instruments for Addressing Externalities." Research from the Netherlands, the UK, and the US provide estimates for externalities from food production. The key factor in estimating the externalities associated with GHG emissions from agriculture is the value attributed to the social cost of carbon.

His discussion then focused on the policy instruments used to address externalities. These include economic incentives, such as taxes (carbon taxes) and subsidies; regulations; zoning; contracting and conservation easements, cross compliance and BMPs. He discussed the pros and cons of each, providing examples from real life. While regulations can be used to target externalities more easily, they are considered less effective than taxes for modifying behaviour. He described cross compliance, which has

been used in the US to conserve wetlands, and in the EU to promote environmental behaviour, with poor results. Zoning has been used to conserve farmland, but tends to be inequitable, punishing certain landowners. Payments for EG&S, such as conservation easements, have been used effectively. However, he argues that promotion of BMPs are probably the best way to address externalities in agriculture. R&D and extension play an important role here.

Derek Tallon, a grain farmer from Saskatchewan, focused on the role of innovations in addressing negative externalities and described how innovations at the farm level has been important for encouraging environmental performance and production practices. He argued that economic drivers have been key for encouraging farmers to adopt no till on the Prairies. More recent technologies, such as nitrogen stabilizer technologies (e.g., polymer coating) and precision agriculture technology provides an economically and environmentally desirable outcome by reducing the excess use of fertilizers or pesticides. It will be important to attach a property right to the environmental benefits of practices and make it traceable. In this way the verified sustainability model will be important for increased sustainability, by providing economic benefits.

SESSION 6: PRACTICES AND POLICY OPTIONS

Professor Chad Lawley of the University of Manitoba spoke on "Factors Affecting Land Use Choices and Agronomic Practices: Agri-environmental policy design and evaluation." He specifically focused on the use of conservation easements for preserving wetlands in Manitoba and the impact on land values and decisions to preserve this land, as an example of an effective policy that affects land use choices.

Farmers respond to incentives and so will convert wetlands on their farms to cropland if they anticipate increased returns to crop production relative to livestock production, improved crop productivity, climate change, subsidized crop insurance and larger machinery. Because private landowners do not extract social value from conservation, conservation programs have to provide them with an incentive to preserve this land. Regulations that restrict conversion are hard to enforce and are ineffective. Conservation easements, which lead to agreements to preserve wetlands between landowners and conservation organizations, such as DUCKS Unlimited or the Nature Conservancy, have been found to be more effective. With these programs, a landowner receives a premium on acres of wetlands that are not drained. Land values are impacted by easements since they restrict a landowner from realizing potential future benefits. Using data from Manitoba, Lawley and Towe (2014) determined that the sale price of land with an easement was on average $86 /acre, which is $30 per acre less than land without an easement in that area. Since some low-quality land will never be converted, the design of conservation easements and premiums have to take this into account and should only be paid if there is a high probability of conversion.

Lawley discussed other policies and programs that are used to encourage EG&S on land, including cost-sharing to promote BMPs, such as permanent cover, minimum till, manure management, surface or tile drainage or precision agriculture. He found that there is little research on the effectiveness of cost-share programs related to BMPs on conservation and more needs to be done.

The discussants, **Stan Carscallen**, **Richard Gray** and **Graeme Finn** raised the following issues:

- There is market failure in the provision of EG&S since private firms won't invest where there is no return. Industry goods are public goods where the spillovers are concentrated within the industry. Producers and other parts of the supply chain directly benefit from addressing market failures in their industry while the general public only has an indirect interest. Environmental protection is increasingly becoming an industry good because consumers are expecting their food to be produced sustainably. Industry organizations can play an important role in innovation by creating industry goods. Government policy alone will not solve these problems. So, the question becomes: what is the role of industry organizations and NGOs in creating an innovation system that will address climate change and habitat preservation?
- Canada is lacking programs for Agricultural Conservation Easements, while they are available in the U.S., such as their Eco-gift programs, which involves donations of valuable farmland to receive special tax treatment. Programs for encouraging farmers to protect valuable farmland is essential for sustainable food production in the future.
- It is possible to run a sustainable and profitable farm operation with no government subsidy and improved resilience in drought conditions, but this requires doing everything right, and it is a knowledge-intensive operation.

SESSION 7: WRAPPING IT UP: IS THERE A CLEAR WAY FORWARD FOR OPTIMIZING LAND USE FOR SUSTAINABLE GROWTH?

Session 7 was a breakout session whereby participants were organized into three groups to discuss and report on the answers to three questions:

1) Are crops and animals in direct competition to reach higher sustainability outcomes?
2) What direction and instruments are most promising for crop production sustainability outcomes?
3) What direction and instruments are most promising for livestock production sustainability outcomes?

On reporting back after reconvening in the plenary room, the three groups came to some very similar conclusions on **Question 1**. All agreed that crops and animals are not in competition to reach higher sustainability outcomes, but are complementary and synergistic, both benefiting from working together. Government programs may encourage specialization, but there was generally agreement that diversity was very important and lead to enhanced resilience for producers. "We need room for all kinds of agriculture."

Regarding **Questions 2 and 3**, all groups considered them together because of the complementarity of crop and livestock production. Again, there was talk of government's role in ensuring Canadian agriculture was addressing environmental impacts and sustainability. There was recognition that markets do not always reward the most sustainable production practices. But farmers should not be the ones to bear all the cost of preserving the commons. Because one size does not fit all, policy instruments need to vary to accommodate the heterogeneity and diversity of farming.

One solution proposed was a "Grand Challenges" program. The concept is modelled after the original "Grand Challenges in Global Health" initiative, launched in 2004 by the Bill and Melinda Gates Foundation. The purpose of this program was to fund promising early-stage scientific innovations that could prevent, treat and cure diseases in the developing world. The program originally brought together the brightest scientists to solve some of the biggest development problems of the poorest countries and peoples (i.e. Malaria, HIV), and to make those results freely available to them. Its goal was "bold ideas for big impact" and it addressed many of the UN's Sustainable Development Goals (SDGs). The Grand Challenges program proposed in Calgary, based on the identification of the main challenges for sustainability (i.e. soil, water, air, biodiversity), would challenge all stakeholders to come up with a toolbox of innovative solutions and would lead to the development and adoption of new technologies, with the goal of providing future generations.

During the break-out sessions there was general agreement that public good R&D is essential, as new products, processes, practices and technologies can lead to sustainability outcomes. It is also important that the regulations developed around these new technologies be enabling and not obstructive. Also, more focus should be on extension and knowledge dissemination, since BMPs are generally considered one of the best options for achieving sustainable outcomes.

The importance of data and metrics again came through in the discussions. However, as was clear from the presentations, averages do not always tell the right story, since there can be great differences between regions (East and West), risk attitudes, farm size and farm type. Also, educating both consumers and future generations about the good things on our land is essential. Succession planning needs to be a part of this. Finally, communicating the positive stories will also help in branding Canadian agricultural products and provide the sector with the social license required to continue to produce.

The Dialogue ended on a positive note when the Next Generation participants were introduced and asked to provide their impressions of the event. AAFC had sponsored their participation. Most were very pleased to participate in the discussions and enjoyed the level of interest around this very important topic. They reported that they had learned a lot from the diverse views expressed and were happy to see so many other young people engaged in the Dialogue.

CONCLUSION

Much food for thought was generated at the Calgary Dialogue. It is clear the sector is doing its part to improve its environmental impacts for future sustainability. But there are still many challenges ahead to be addressed. Knowledge, better practices, data and metrics and innovation and new technologies will help address these challenges. The government can have a role by providing incentives to adopt sustainable production practices. Industry has a role as well, by innovating and developing transparent systems for verifying sustainable production practices. Another CAPI Dialogue in Guelph in late April 2019 may generate further insight into the way forward for the sector in ensuring future quality growth.