

# Ag-Tech Dialogues: Interim Report

Collaboration to Drive Agri-food  
Innovation in Canada

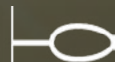
Arrell Food Institute (University of Guelph)

Food and Agriculture Institute (University of the Fraser Valley)



**ARRELL  
FOOD INSTITUTE**

AT THE UNIVERSITY of GUELPH



**UNIVERSITY  
OF THE FRASER VALLEY**  
FOOD AND AGRICULTURE INSTITUTE

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# Letter from the Chairs

**Canada's agri-food sector is vibrant, diverse, and growing.**

This is what the three of us heard over the summer of 2023 when we, backed up by an excellent team of student researchers, a high-level Advisory Board, and administrative support from Arrell Food Institute, reached out to stakeholders in the agri-food sector from across Canada. We were interested in people's perspectives on the role of science, technology, and innovation as it pertains to food production, profitability, and sustainability. Our goal was to have a dialogue that will, ultimately, lead to recommendations to position Canada as a world leader both in innovation as well as in sustainability in the agri-food sector.

Based on what we've heard thus far, we think that Canada should commit to creating a "Brand Canada" that is unequivocally linked with safety and sustainability and to being a top three player in agricultural technology (ag-tech) by 2035 in terms of key indicators such as companies launched, patents filed, value of technology exported, and highly qualified personnel trained. This "3 by 35" goal is both aspirational and achievable.

We are currently halfway through our process of listening to different perspectives and offer the following "what we heard" report where we have summarized our interim findings. Our next steps are to solicit feedback on this document through a series of fall engagement activities including events (online and face-to-face), a web portal, and further interviews.

We would like to thank everyone who has participated in the process and are excited to hear feedback and suggestions.

With kind regards,

*Peter Dhillon, Lenore Newman, and Evan Fraser (co-chairs)*



**Please scan the QR code to provide a commentary or reaction on our web portal, and please pass this document around to your networks.**

Link: <https://arrellfoodinstitute.ca/feeding-the-future-with-canadian-technology/>

# Executive summary

The purpose of the Ag-Tech Dialogue Initiative is to explore how new and novel innovations offer us tools to produce more food on less land with fewer inputs, enhancing the productivity and sustainability of the agricultural sector.

Our dialogues also explore the current limits of technology, and our aim is to build a road map for Canada that will position our country, and our agri-food sector, as the world leader for sustainability, profitability, and technological sophistication. We hope to clearly establish Canada as a top three performer by 2035, helping to build a “Brand Canada” that is known globally for safety and sustainability in agri-food.

This document represents an interim “what we heard” report based on interviews and focus groups with dozens of people during the first half of 2023 (see *Annex 1 for full list of activities*).

## Out of these engagement activities the following points stand out:

1. **Canada is living through an exciting moment**, and although the disruptions caused by climate change, political conflict, biodiversity loss, and zoonotic disease seem daunting, our country can display global leadership in being a world leader in producing safe, plentiful, nutritious, and sustainable food for the next generation.
2. **The world of agriculture is changing very quickly** with new technologies driven by genomics, robotics, and artificial intelligence increasingly being used in food production and processing. Properly applied, new innovations can give us the tools to boost production while shrinking the environmental footprint of food. However, ensuring these technologies are applied in a way that benefits farmers, society, and the environment requires collaboration between actors across the food system.



**From our consultations, and these two big picture points, emerges a preliminary five-point plan that suggests a blueprint for action:**

- 1. Support Entrepreneurs.** Innovators, entrepreneurs, and early-stage companies need clearer pathways to launch commercially viable enterprises. This includes better business training for STEM graduates and funding for incubation and acceleration. Later in the innovation pipeline, Canada should increase efforts to provide entrepreneurs with investment and access to global markets and create an ag-tech concierge service to help innovators navigate complex regulatory landscapes.
- 2. Train the Next Generation.** In the future, the agriculture and agri-food workforce are just as likely to wear lab coats as rubber boots. Consequently, the skills needed by the next generation of producers and the tremendous workforce in the agri-food sector will be an expansion of the skills needed by past generations. To thrive in the sector, young people need to excel in traditional disciplines such as soil, crop, and livestock science and emerging disciplines including advanced engineering and computer science. In addition, young people entering the sector need to be innovative thinkers. Canada should support training that expands disciplinary focus, emphasizes innovation to achieve application, and is designed in partnership with industry.
- 3. Reduce Risks of Innovation.** Changing management practices and doing things in new ways is risky. Most farm operations operate with very thin margins. This means that many owner-operators and producers need better financial supports to reduce the risks associated with adopting new innovations. Furthermore, many novel technologies are data-driven and digital, meaning that cyber security threats can impact food systems. We must develop mechanisms to reduce risks associated with investing in and deploying new innovations.

- 4. Establish Policy Leadership.** Too often good ideas fail to get to the market due to policy or regulatory problems. For example, in some provinces obtaining zoning permission for food processing and vertical farming is challenging. Another illustrative bottle neck relates to data governance. Given that many new innovations rely on data, establishing clear, equitable and fair guidelines on data ownership, use, and privacy is critical. There is an urgent need to establish a clear policy vision and use that vision to help dismantle roadblocks and help innovators move their ideas smoothly into society with a minimum of delays and red tape.
- 5. Fund Applied Research and Innovation.** While new technologies offer us the promise of producing more food with smaller environmental impacts, there are still gaps where research is needed. For example, the number of crops currently suitable for vertical farming is generally limited to green leafy vegetables and micro greens. If vertical farming is to expand, new varieties of other crops (e.g., head lettuce or strawberries) will need development. Therefore, we need to increase support for targeted late stage and commercially close to ready research. This funding should be tied to collaboration between industry and the university sector and involve both traditional research settings (e.g., universities and government labs) and applied, later-in-pipeline settings that might not sit within academic institutions.

## **Today, Canada faces a huge opportunity to be a global leader in agri-food innovation.**

But we risk falling behind. By looking to global leaders such as the Dutch “triple helix” approach and Singapore’s “2030” strategy, we can state with confidence that it is only through collaboration that any meaningful progress can be made. While we heard a very strong sense of optimism that novel innovations and technology, backed with investment, can provide new tools to allow our country to profitably produce more nutritious food while reducing the environmental burden of food systems, we will not realize this potential unless innovations are supported with engagement, consultation, and dialogue. It is only by engaging with the broader community to build solutions, and in particular centring engagement on producers, that we will collectively move forward.

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**WHAT WE HEARD PART I:**

# Canada's Moment

*Canada is an agricultural powerhouse.*

We are a net exporter of food and agriculture products in most major categories suitable to our climate with deficits in corn, nuts, fruits, and vegetables. Horticultural production fluctuates strongly with the seasons.<sup>1</sup> We were the 5th largest food and agriculture exporter in 2022 according to Agriculture and Agri-Food Canada, accounting for over 6% of global food production.

Our agricultural innovation sector does not yet reflect our position as a food production superpower.<sup>2</sup> In fact, the Agri-Food Innovation Council showed that funding for agricultural innovation is only 0.046% of GDP and has fallen for over three decades at a steady rate.

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1 StatCan (Statistics Canada). (2023). Supply and disposition of food in Canada, Table 32-10-0053-01. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3210005301>

2 <https://www.aic.ca/wp-content/uploads/2021/04/AIC-An-Overview-of-the-Canadian-Agricultural-Innovation-System-2017.pdf>

Despite ranking 8th globally in agricultural research, the number of patents in agricultural technology has fallen steadily in lockstep with declining funding. Lack of support for processing is particularly sharp, contributing to trade deficits in many categories of processed food products. A lack of focus on novel production technologies is particularly telling in weather dependent product categories; Canada imported over \$11.8 billion in fruit in 2021.<sup>3</sup> However, in areas where technological innovation has flourished, very different patterns are found. Canada exports more greenhouse vegetables and mushrooms than it imports.

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## *The takeaway:*

**Canada can and does contribute substantially to the global food system, but there are clear untapped opportunities and areas of concern to be addressed.**

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The last few years have been challenging for our food systems, highlighting the precarity of global “just in time” supply chains. But against an often terrifying and chaotic global backdrop is a tremendous opportunity to strengthen our food security, our national security, and our economy through one set of interventions. We can invest in the innovations and management practices that will allow producers to meet the needs of the growing human population all while reducing the environmental footprint of food and farming systems and enhancing the resilience of food supply chains to disruptions.

If we do this, we have an opportunity to expand our exports and build a “Brand Canada” that should be clearly established in the minds of global consumers as the source of the world’s safest and most sustainable food. We should also commit to being in the top-three countries in the world in terms of agri-food innovation.

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<sup>3</sup> StatCan (Statistics Canada). (2023). Supply and disposition of food in Canada, Table 32-10-0053-01. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3210005301>



**And, we must all remember that the world of agriculture is changing very quickly. During our conversations we heard about rapid advancements in the areas of:**

- Genomics used to create more drought- and salt-tolerant crops.
- Year-round horticultural production.
- Improved livestock management to reduce greenhouse gas emissions.
- Data analytics and input management strategies to give producers much better insights into their operations.
- Supply chain technologies and logistics that reduce waste and boost efficiencies.
- Production of novel proteins that are healthy, sustainable and will create new food options for consumers.

Properly applied, these innovations (and others) give us tools to boost production while shrinking the environmental footprint of food. However, ensuring these technologies are applied in a way that benefits society and the environment requires collaboration between all actors up and down the food system.

These are the key messages that we have heard throughout our consultations in the spring and summer of 2023, and they lead us to propose the following five-point plan that will, we think, allow our country to collaboratively use these innovations. If we do, we will take a global leadership position that will help humanity solve one of the most pressing issues facing the 21st century: how to produce enough healthy food for the growing human population without destroying the very ecosystems on which we all depend for life.

— **WHAT WE HEARD PART II:**

# A Possible Five-Point Strategy

## 1. Support Entrepreneurs



*Innovators, entrepreneurs, and early-stage companies need clearer pathways to launch commercially viable enterprises. This includes better business training for STEM graduates and funding for incubation and acceleration. Later in the innovation pipeline, Canada should increase efforts to provide entrepreneurs with investment and access to global markets.*

## The assets we already enjoy.

We have an extraordinary ecosystem of incubators and accelerators already present across the country. This landscape has a well-established track record of success in increasing survival rate of businesses as well as supporting their success in growth and scaling (increased employment, revenue, etc.).<sup>4</sup> Incubator and accelerator programs are often regionally focused and sector specific (i.e., *Communitech* in Kitchener), allowing them to provide deep networks of expertise and funding for the entrepreneurs. There are a few examples of strong agriculture and technology-focused programs in Canada such as *Bioenterprise* and *Creative Destruction Labs - Rockies* that provide mentorship, training, and financial support to aspiring entrepreneurs.

## What we heard.

Despite the tremendous assets such as *Communitech*, *CDL-Rockies* and *Bioenterprise* (among others), we heard that if our country hopes to be a global leader in terms of nurturing innovation, **we must do a better job in creating comprehensive support for early-stage companies**. A key barrier identified by research participants for early-stage entrepreneurs included large capital expenditures and overhead, as well as complex funding requirements that prohibit entry into the research and development and/or scaling phases of innovation.

Early-stage entrepreneurs face substantial hurdles in moving from pilot/demonstration scales to commercial technology extension and dissemination. Interviewees highlighted the requirement for substantial funding in industries with a high capital expenditures component, such as equipment manufacturing, vertical farming, or robotics and automation, in contrast to software manufacturing and other app-based applications. This challenge is compounded by funding structures, which require existing financial information and, in some cases, matching cash from prospective funders. This led some participants to suggest that major lending institutions are overly conservative in financing ag-tech.

A few participants emphasized the importance of region-specific innovation hubs that cater to the place-based agricultural context in which they are located. Leveraging academia's networks and the federal government's ability to convene stakeholders are key opportunities to address issues related to siloing and communication breakdowns between ag-tech stakeholders.

<sup>4</sup> [The Business Accelerator and Incubator Performance Measurement Framework \(BAI PMF\)](#) | Tableau Public

We also heard that it is very hard for would-be entrepreneurs to navigate the landscape of accelerators and entrepreneurs and that in many cases aspiring innovators lack even the basic skills of business development to be admitted to existing programming.

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*“Many funds are smaller in size, and [funders] can’t really afford to invest in business models that have a high capex component...So some mechanism to recognize that capex and equipment costs are a real cost of ag tech development and finding a way to [get it done]. It’s easier said than done.”*

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### **Potential recommendations for discussion and further elaboration.**

As a result of the conversations to date, we are exploring two possible proposals that we will develop over the second half of this dialogue series:

- *The creation of an “**innovation, incubation and acceleration concierge**”. This concierge would be a bridging entity that assists start-ups and pre-start up university innovators with organizations such as CDL-Rockies or Bioenterprise and seeks to pair industry with academic talent as well as emerging innovations with mentorship programs and funders.*
- *An exploration of the architecture needed to create a more **robust environment for investors** including venture capitalists with an interest in technology and sustainability to develop funding opportunities focusing on agriculture and food.*

We hypothesize that if these two entities were created, they would go a long way to address some of the concerns expressed during the first half of our dialogue series. So, we would love feedback and insights into how to develop these ideas further.

## 2. Train the Next Generation



*In the future, the agriculture and agri-food workforce are just as likely to wear lab coats as rubber boots. Consequently, the skills needed by the next generation of producers and the tremendous workforce in the agri-food sector will be an expansion of the skills needed by past generations. To thrive in the sector, young people need to excel in traditional disciplines such as soil, crop, and livestock science and emerging disciplines including advanced engineering and computer science. In addition, young people entering the sector need to be innovative thinkers. Canada should support training that expands disciplinary focus, emphasizes innovation to achieve application, and is designed in partnership with industry.*

### **The assets we already enjoy.**

Canada enjoys a truly world class network of colleges and universities that boast top notch professors. Our agricultural and food colleges and universities offer an extremely wide range of degree and certificate programmes across all levels and relevant disciplines. And we boast many globally leading research facilities that span the spectrum from crop and livestock genetics facilities through to soil science and crop science for all major commodities and products. *The Deans Council – Agriculture, Food & Veterinary Medicine* – is a national organization made up of all relevant faculties, including our five veterinary medicine and eight agriculture and food faculties. This foundation gives us a world class base on which to grow our collective aspirations to be one of the world's undisputed top countries for agri-food technology development.

### **What we heard.**

Given the rapidly changing technological landscape of farming, there is a need to **change how we train the next generation of the agriculture and agri-food workforce**. Additionally, the demand for highly trained people in this field far outstrips supply and this problem is accelerating. Consequently, there is a need both to recruit more young people (including more new Canadians) into the sector as well as to greatly expand training opportunities that include new technologies.

Agriculture is also like other sectors of the economy in that to thrive new trainees need to be (1) excellent in terms of traditional disciplinary expertise (in this case such as soil, crop, or animal science), (2) technologically sophisticated and (3) what are sometimes called “systems thinkers” skilled in the “soft” or “foundational” skills of project management, critical thinking, communications, and conflict resolution. This is because the workplace of the future, whether it is on a farm or somewhere else in the economy, will generally require working in small teams to use technology and troubleshoot problems.

In addition, many of the people we spoke with identified major labour disruptions and disconnections between sites of technology development (urban) and deployment (rural) as key barriers for the development of effective technologies and a stronger agricultural labour force. Canadian agriculture is changing, with a substantial focus on automation to address labour shortages. This poses major questions and concerns for both farmers as well as farm workers, where there is a trade-off between addressing labour shortages and automating existing and potential jobs. Participants also noted a disconnect between those who were developing technologies and the applied, on-the-ground validation and testing of those tools. Those with skills to engineer and develop tools and technologies tend to have less applied and on-the-ground training for the application of technologies on-field, making technologies possibly less useful and/or effective in-field. Further, there tends to be less available labour for convenient and efficient service in a timely manner for equipment breakdowns.

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*“You’ve got all these ag tech companies and it’s like people who have never been on a farm, and you know, they’re trying to develop and pilot out this tech and they don’t have a real world context to do it in, or those connections and that expertise...”*

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*“...Summer student positions were important to me because it meant I actually got to go and meet with producers. I think that’s really important for people who want to be involved in agriculture because producers are usually the end users of the resource of the research that we do.”*

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## Potential recommendations for discussion and further elaboration.

A few key strategies to support the next generation workforce include:

- *Create a virtual mechanism to better allow **peer-to-peer networking**. To do this, we must first identify technology adopters within communities and support them to become ambassadors who can formally be engaged to do extension.*
- *Investigate **leveraging social media** as a possible strategy to support training in the sector, especially for younger generations of farmers.*
- *Advance applied skills development through **more co-op educational opportunities and experiential training programs** that link producers with academics and companies. This would require more funding into ag-tech co-op programs as well as working to build more bridges between agricultural, engineering, and computer science faculties such that students in non-agricultural disciplines have opportunities to gain valuable job experience in the agricultural and food sectors.*

Overall, addressing these complexities requires significant expansion of the Canadian post-secondary training landscape. Better collaboration between agricultural, engineering, and computer science faculties will help create more synergies between traditional agricultural disciplines and emerging STEM subjects (science, technology, engineering, and math). This should help ensure that there are more agriculture-related co-op opportunities.

### 3. Reduce Risks of Innovation



*Changing management practices and doing things in new ways is risky. Most farm operations operate with very thin margins. This means that many owner-operators and producers need better financial supports to reduce the risks associated with adopting new innovations. Furthermore, many novel technologies are data-driven and digital, meaning that cyber security threats can impact food systems. We must develop mechanisms to reduce risks associated with investing in and deploying new innovations.*

#### **The assets we already enjoy.**

Compared with other countries, many aspects of our agri-food infrastructure are cutting edge and world-leading. We have one of the most trusted and stable regulatory environments on the planet. We also have business risk management programming including crop insurance that helps reduce risks associated with crop failures. These are tremendous and well-established assets. In addition, there are the beginnings of a national discussion around how to mitigate risks of innovation through funding mechanisms (e.g., the recent Royal Bank of Canada-led reports on agriculture and greenhouse gas emissions suggest numerous strategies).<sup>5</sup> Meanwhile, a large project led by the Community Safety Knowledge Alliance establishes a “cyber barn raising” framework aimed at addressing cyber risks linked with digital innovation in agri-food.<sup>6</sup>

#### **What we heard.**

A key theme that ran through all our engagement activities related to **emerging risks associated with innovation**. Adopting new technologies or management practices, exploring new markets, and producing new consumer products all imply risks – which bring both successes and failures. In addition, many of the innovations brought forward during this dialogue are data-driven and digital, leaving farming open to malicious cyber security attacks, such as those seen in sectors such as medicine and finance.

But farmers alone cannot be expected to bear the risks of innovation. Nor can early-stage entrepreneurs. Both groups have the least capacity to experiment with risky ventures. But in this moment of great environmental and geopolitical turbulence, and with emerging technologies rapidly coming onto the market, we need our producers and entrepreneurs to be able to experiment, figure out what works, and discard non-viable solutions.

5 <https://thoughtleadership.rbc.com/a-new-ag-deal-a-9-point-plan-for-climate-smart-agriculture/>

6 <https://cskacanada.ca/wp-content/uploads/2023/03/CSKA-CyberBarnRaising-FIN-digital.pdf>



## Potential recommendations for discussion and further elaboration.

Three potential strategies surfaced through our conversations to help reduce the risks associated with innovation.

- *In any community, there are individuals who are more and less willing to try new tools – working proactively and iteratively with such “**early adopters**” can support technology developers to create products that are more effective and efficient, earlier-on. Identifying early-adopters could also be a key opportunity to facilitate market testing and entry for new technology companies. However, incentives are important to support these individuals to take on the risk of new technology trials. This is particularly important in the context of developing incentive programs for those who may be less risk accepting but benefit from the trials and tests of early adopters.*
- *Federal or provincial mechanisms could allow companies to make capital expenditures and in return **receive favorable tax credits or repayment options** on loans. Similarly, other proposals listed in this interim report would also reduce the risk of adopting novel management practices or technologies. Overall, we will require a portfolio of strategies to reduce the risks associated with innovation - specifically the risks faced by early-stage entrepreneurs and producers.*
- *Our country would benefit from a **pan-Canadian consultation** aimed at fleshing out the details of a national framework for cybersecurity in agriculture.*

In the final phase of this dialogue process, we would like to seek feedback on these proposals and other ideas that have yet to be surfaced.



## 4. Establish Policy Leadership

*Too often good ideas fail to get to the market due to policy or regulatory problems. For example, in some provinces obtaining zoning permission for food processing and vertical farming is challenging. Another illustrative bottle neck relates to data governance. Given that many new innovations rely on data, establishing clear, equitable and fair guidelines on data ownership, use, and privacy is critical. There is an urgent need to establish a clear policy vision and use that vision to help dismantle roadblocks and help innovators move their ideas smoothly into society with a minimum of delays and red tape.*

### **The assets we already enjoy.**

In 2017, the Advisory Council for Economic Growth (aka, “the Barton Report”) proposed a vision for the Canadian agri-food sector: that Canada become the world’s trusted leader in the production of safe and sustainable food.<sup>7</sup> Since then, a steady stream of high-profile reports all make similar arguments. These include the BC Premier’s *Task Force on Food Security*,<sup>8</sup> a Senate of Canada report on creating more value-added in the Canadian food sector,<sup>9</sup> and a series of 5 reports that came out in 2022-23 as a collaboration between the Royal Bank of Canada, the Boston Consulting Group, and Arrell Food Institute at the University of Guelph.<sup>10</sup> Relatedly, the Canadian “National Index On Agri Food Performance”<sup>11</sup> is a growing coalition of private and public partners who are working to present an integrated vision of sustainability for Canada’s agri-food sector. We already, therefore, have a vision (or rather, multiple converging visions) for what the Canadian agri-food sector could be. The strength of these visions is that they are presented by an extended network of stakeholders that include all key actors across the food system, from producer groups through to processors and retailers as well as community organizations.

7 <https://www.budget.canada.ca/aceg-ccce/home-accueil-en.html>

8 <https://engage.gov.bc.ca/govtogetherbc/engagement/food-security-task-force-results/>

9 <https://sencanada.ca/en/info-page/parl-42-1/agfo-made-in-canada/>

10 <https://thoughtleadership.rbc.com/the-next-green-revolution-project/>

11 <https://www.agrifoodindex.ca/>

## What we heard.

While conducting the interviews for this report, we learned about **significant policy gaps and regulatory hurdles**. Slow and overly complicated approval processes (for example to get permission to build vertical farming infrastructure) mean some enterprises have moved to other jurisdictions. When these regulatory problems are combined with the relatively small domestic market for food, some enterprises argued that the cost of doing business in Canada is greater than the benefits of accessing our markets.

Another area where policy leadership is needed relates to data and data governance. Participants noted that there was mistrust as to how farmer-generated data would be used, either by government to develop possible regulations, or for private companies to lock technology users into suites of tools. Consequently, an important area for policy is to establish principles and procedures that will protect producers who generate data and ensure there are ways of sharing the benefits of these data with the people who generated them. Given that most of the emerging transformative innovations in agriculture rely on data, creating an equitable and transparent data landscape is a precursor to achieving our vision of Canada being a global leader.

An additional topic related to data governance is the broad area of interoperability, which is the ability to integrate different datasets (such as climate, soils, market, or farm management data). Research participants discussed how currently, in the fragmented technology marketplace, few tools developed across different companies can communicate with one another. This makes it challenging and time consuming for technology users to switch between tools offered by different companies.

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*"I guess it's the old carrot and stick challenge. We realized that the sticks are the less desirable approach and the carrots would be better, so hopefully that is how sustainable ag strategy rolls along, that we'll be able to find more of those carrots rather than the sticks. But, you know, I am also finding that when some organizations come to us with their ideas...they often want things enshrined in regulation."*

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*"...there's a strong history ... of large companies, ... taking farmer data, using it to market to them to sell to them, and to lock them into a particular vendor ecosystem. And I think for that reason, farmers, very reasonably have misgivings about what's being done with their data..."*

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## Potential recommendations for discussion and further elaboration.

Three immediate recommendations emerged from our consultations.

- *There is a key need for better data governance and policies that lead to **greater interoperability and data sharing**. Data governance must also put user control at the centre and, to match technologies more effectively to user needs, we must commit to continuous engagement, validation, and testing of novel technologies with farmers. For interoperability considerations, specifically, participants suggested that the government could better explore and adopt global best standards regarding data standard development (i.e. there is no need to re-invent the wheel with regards to data standards).*
- *Canada needs **greater collaboration and dialogue** between industry members and policy-making bodies, including various federal and provincial ministries and departments to help make the process of bringing innovations to the market more streamlined across Canada. Especially as it comes to promoting environmental policies, sustainability, and greenhouse gas mitigation, the messages we received were loud and clear. Producers need incentives (and not penalties or excessive regulations) and the current landscape of policy making that includes multiple jurisdictions at multiple scales is a real barrier to innovation.*
- *More tactically, there is a need to **convene policy teams** to identify and help clear policy roadblocks. Two examples illustrate this need. First, in some provinces vertical farms often do not qualify as sufficiently agricultural to be permitted on agricultural land, nor do they qualify as sufficiently industrial to be built on industrial land. Hence aspiring vertical farmers find themselves in a regulatory dead zone and unable to invest in our country. Similarly, some companies producing novel food ingredients struggle to gain access to Canadian markets; there is a need to proactively assess the health and safety of novel food ingredients and, once new ingredients are proven safe, create regulatory pathways that allow such products to enter the market. Policy think-tanks need to be resourced to identify where such roadblocks may exist and convene the relevant stakeholder groups to propose alternative policies and lobby for change.*



## 5. Fund Applied Research and Innovation

*While new technologies offer us the promise of producing more food with smaller environmental impacts, there are still gaps where research is needed. For example, the number of crops currently suitable for vertical farming is generally limited to green leafy vegetables and micro greens. If vertical farming is to expand, new varieties of other crops (e.g. head lettuce or strawberries) will need development. Therefore, we need to increase support for targeted late stage and commercially close to ready research. This funding should be tied to collaboration between industry and the university sector and involve both traditional research settings (e.g., universities and government labs) and applied, later-in-pipeline settings that might not sit within academic institutions.*

### **The assets we already enjoy.**

Canada has an enviable research landscape with top quality facilities at our universities and colleges. Agriculture and Agri-Food Canada's "Living Lab" network also provides opportunities for direct interaction between industry and research, and each province hosts a vibrant ecosystem that supports both basic and applied research. Research councils have directed significant funding towards research on agriculture and food in recent years, including major investments by the Canada First Research Excellence Fund to the universities of Guelph and Saskatoon. The National Research Council of Canada's *On The Horizon* report identifies agriculture as a key area for investment to address challenges such as climate change and sustainable resource use<sup>12</sup> and the Canadian Council of Academies is currently undertaking a study on atypical food production technologies for Canadian food security.<sup>13</sup> Together this formidable foundation, which includes hundreds of researchers and faculty members, is a launchpad for strategic investment to enhance our capacity for innovation in agriculture and food.

12 <https://nrc.canada.ca/sites/default/files/2021-07/on-the-horizon-e.pdf>

13 <https://cca-reports.ca/reports/technologies-for-canadian-food-security/>

## What we heard.

One of the first things we heard was that despite excitement around innovations in agriculture and food technology, there are still **serious research gaps that need to be filled** before technologies can become commercially viable. For instance, vertical farms that use hydroponics and LED lights offer us the promise of year-round fresh fruits and vegetables anywhere in the world. But these technologies have only been proven for a small number of crops including green leafy vegetables. While systems to produce other crops such as strawberries or blueberries in these indoor facilities are being developed, there are still major scientific hurdles.

Several research participants identified a mismatch in current funding mechanisms, a lack of technology development and provisioning for diverse farm sizes and types, and lack of inter-sectoral communication as key barriers to supporting the ag-tech innovation system. Funding mechanisms slow down beyond the initial start-up phase, and large-scale granting opportunities are challenging to pitch for.

## Potential recommendations for discussion and further elaboration.

Our preliminary assessment is that although Canada is well served with many research opportunities, three potential proposals stand out as worth investigating:

- *We must ensure that **funding agri-food and sustainability research** grows as a priority for Canada's research councils and provincial funding bodies.*
- *Building on the Government of Canada's existing challenge funding structure, we think there is an opportunity to **establish a broader base of challenge related funding opportunities**, perhaps linked with government initiatives, that could provide solutions to specific problems. For instance, the Weston Family Foundation's Homegrown Innovation Challenge is a \$35 million philanthropy driven initiative that is funding public private partnerships to increase the economic and technical viability of year-round fresh berry production in Canada. This model would bring public resources together with philanthropy to create a new wave of challenge related research projects.*
- ***IP strategy and supporting researchers** in moving their innovations to market.*

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# Conclusion

Over the course of this research, we have been so impressed by the sophistication and enthusiasm everyone has brought to this project. There really does seem to be a shared understanding that at this moment of tremendous anxiety wrought by political instability, a retreat from global trade and cooperation, and the climate crisis there is a magnificent once in a generation opportunity.

But the final message, which is a message we hope cuts through all the details above, is that it is only through collaboration and cooperation that meaningful progress can be made. While new technologies and innovations provide us some tools, technologies are never a panacea and everyone we spoke with cautioned that technologies backed with investment will never solve major problems unless they are broadly supported by producers, consumers, and regulators. Therefore, it is only by building a broad community-based coalition of support that we will collectively move forward.



**Please scan the QR code to provide a commentary or reaction on our web portal, and please pass this document around to your networks.**

*Link: <https://arrellfoodinstitute.ca/feeding-the-future-with-canadian-technology/>*

**ANNEX I:**

# **Our Process**







# Feeding the Future with Canadian Technology:

## Project Process

### DISCOVERY & PLANNING

Initial stakeholder consultations  
Research



### CONSULTATIONS

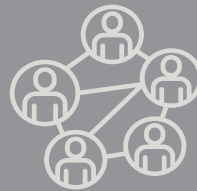
Wider stakeholder consultations  
Interviews

INTERIM REPORT



### DIALOGUE & COLLABORATION

Large group stakeholder engagement  
National engagement  
International engagement and comparators



### SYNTHESIZING FINDINGS

FINAL REPORT



### COMMUNICATION OF FINDINGS

Knowledge mobilization



ANNEX II:

# Our Team



# Our Team

## *Co-chairs*

Peter Dhillon, Lenore Newman, Evan Fraser

## *Staff*

Erin Doherty, Janice LeBoeuf, Elizabeth Shantz

## *Researchers*

Alex Glaros, Emily Duncan, Ajwal Dsouza, Lorraine Vandermyden

## *Advisory committee*

### **Co-chairs:**

Rene Van Acker, Bettina Hamelin

### **Members:**

Nancy Brown Andison

Sylvie Cloutier

Emily Den Haan

Bill Greuel

Kristjan Hebert

Cornelia Kreplin

Tamarra Soma

John Stackhouse

Alison Sunstrum

Steve Webb

Rickey Yada