Joint Submission to Innovation, Science and Economic Development Canada (ISED)

Growing Canada's AI Leadership By Supporting Innovation in Agriculture and Agri-Food

Submitted by: Enterprise Machine Intelligence and Learning Initiative (EMILI) and Canadian Agri-Food Policy Institute (CAPI)

October 30, 2025

For questions, comments or to schedule a follow-up meeting about any of the contents of this document, please contact Kyle Volpi Hiebert, EMILI Manager of Public Policy & Stakeholder Engagement - kvolpihiebert@emilicanada.com

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Executive Summary

Agriculture and agri-food's strategic importance lies not only in its historic role underpinning Canada's economy and food security, but also in its expanding contribution as an engine of innovation, resilience, and sustainability for the broader economy. Continued investment in agricultural innovation strengthens Canada's position as a reliable producer of safe, sustainable food, fuels export growth, and supports long-term economic stability for Canadians at large.

But the sector now stands at a pivotal moment. At a time when farm profitability and sustainability is being impacted by geopolitics, climate change, and more, artificial intelligence (AI) and digital technologies offer enormous potential to strengthen the productivity, resilience and global competitiveness of Canadian farms. And yet Canada lags in the development and adoption of these tools that will drive the future of agriculture and food.

The renewal of Canada's *Pan-Canadian Artificial Intelligence Strategy* thus provides an opportunity to make agriculture a model sector in our country for the safe, trusted, and inclusive adoption of AI — one that drives innovation and prosperity while ensuring no farmer or region is left behind.

AI is already showing its potential to transform farm operations. This ranges from predictive analytics for crop and livestock management to smart irrigation and autonomous machinery, and more.

However, persistent challenges — including poor rural connectivity, limited data governance clarity, low capital availability for agtech startups, and skills gaps across the agricultural workforce — are slowing the Canadian sector's digital transition. Too often, Canadian farmers are watching as farmers in Europe, the US and Australia benefit from the change.

Investing in agricultural innovation is inseparable from investing in infrastructure, not only upgrading physical assets and equipment, but also building out digital networks, data systems, and smart connectivity. Modern infrastructure enables the effective use of AI and advanced tools, and ongoing innovation in agriculture creates demand for world-class infrastructure. Together, they form a mutually reinforcing engine of growth for both the agriculture and agri-food sector and Canada's leadership in AI.

The Government of Canada should embrace this moment to position agriculture and agri-food as a strategic focus area within its updated AI Strategy.

Doing so will ensure that AI adoption drives improved profitability and resilience on Canadian farms while supporting national food security and Canada's vital contributions to the global food system. It will also help foster a broader innovation economy within Canada itself, by transforming Canada's agricultural sector from an important — but often underappreciated — part of the economy to a true strategic asset within a rapidly evolving and digitalizing global economy.

Summary of Recommendations

1. Responsible AI and Data Governance

- Develop a **Pan-Canadian Agricultural Data Governance Framework** aligned with AI ethics standards, clarifying data ownership, portability, and consent.
- Establish **agricultural data stewardship certification** for companies and tools meeting transparency and privacy standards, modeled on the U.S. *Ag Data Transparent* initiative.
- Embed **responsible AI principles** (transparency, explainability, and human oversight) into all federal agtech funding programs and AI-enabled regulatory systems.
- Assign clear accountability for the certification and governance process.

2. Commercialization and Scaling of Agtech Innovation

- Create something akin to a **National Agtech Acceleration Program** under ISED to connect AI researchers, startups, and producers, offering targeted support for scaling and commercialization.
- Introduce **AI innovation vouchers** and tax incentives modeled on France's *France 2030* initiative to help farmers and SMEs access digital advisory and AI integration services.
- Introduce **public-private partnership criteria** into programs such as *AgriInnovate* and *CAAIN* to ensure that AI solutions are co-developed with farmers and address real-world needs.
- Provide support across the commercialization lifecycle by facilitating transitions from pilots to market scale and addressing known barriers such as fragmentation and regulatory inconsistencies.

3. Skills and Talent Development

- Fund a **National Digital Agriculture Skills Strategy** to be executed in conjunction with regional stakeholders to expand data literacy, AI ethics, and technical upskilling across rural Canada.
- Support **applied learning hubs** like EMILI's Innovation Farms and the Pan-Canadian Smart Farm Network to train producers, advisors, and students on safe AI use.
- Incentivize partnerships between colleges, universities, and industry to create **ag-focused AI microcredentials**
- Support building robust local and regional learning ecosystems that adapt to community needs and capacity.

4. Infrastructure and Enabling Environment

- Prioritize the **expansion of rural broadband and 5G deployment** as core infrastructure for AI-driven agriculture.

- Support **trusted testing environments** through smart farms that demonstrate ROI and safety of AI tools before market entry.

A Generational Moment for Canadian Agriculture

As highlighted in a May 2025 report by our two organizations, *The Future is Digital: Digital Agriculture and Canadian Agriculture Policy*, Canada's agricultural sector faces a "now-or-never" moment. Many producers are ready to embrace technology, while others confront barriers ranging from cost to connectivity. The coming decade will determine whether Canada builds a globally competitive agtech ecosystem or continues to lag behind peers like Australia, the Netherlands, and France.

AI represents a natural extension of the digital transformation already underway. Still, while AI tools have begun improving productivity — such as 10–20 percent yield increases and 15–30 percent input cost reductions — adoption remains slow. Without a coordinated national framework for responsible and inclusive AI in agriculture, Canada risks falling further behind in global competitiveness and innovation leadership.

Integrating agriculture into the National AI Strategy will yield benefits across all of ISED's strategic pillars: ensuring responsible AI governance, enabling commercialization and scale-up of Canadian innovations, expanding digital and AI skills training and providing rural connectivity and data infrastructure to support safe adoption.

Figure 1: Agtech adoption rates in Canada, 2016-2024

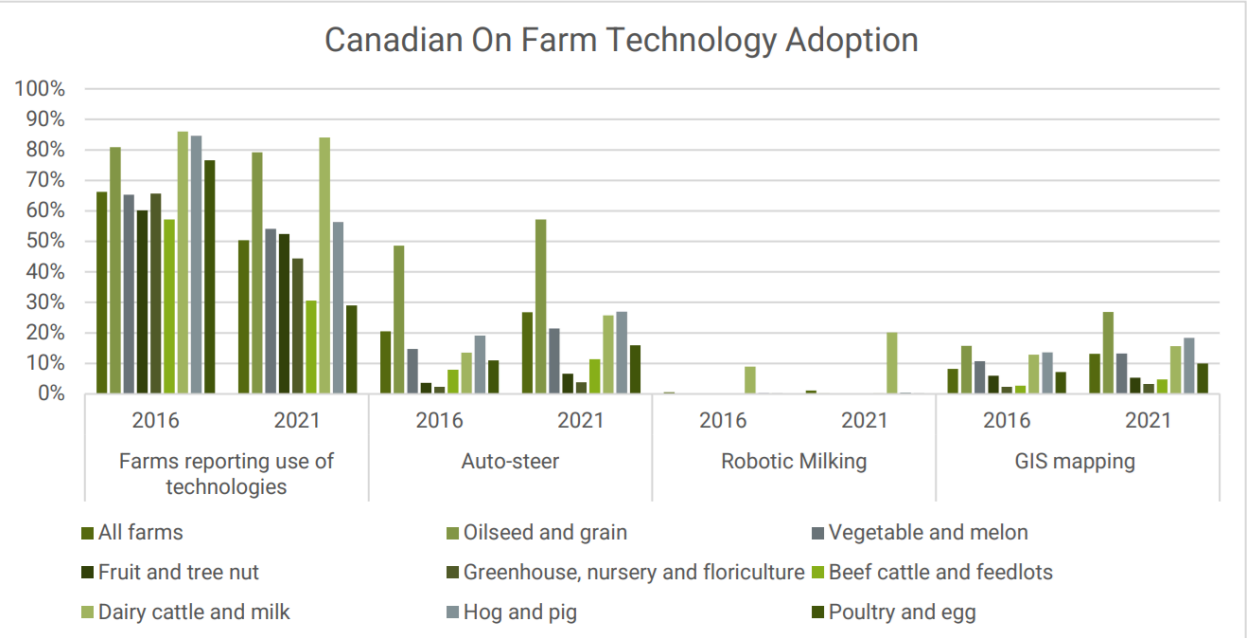

Image: CAPI | Sources: Enstroem, et al, 2023; Easher, et al, 2024

The Opportunity: AI as a Productivity Engine and Strategic Asset

Farm Credit Canada estimates that returning to historical productivity growth of 2 percent per year could add $30 billion in new agricultural revenue over the next decade. AI-driven technologies are critical to achieving that growth.

Examples include:

- **Predictive analytics and machine learning** for yield forecasting, disease detection, and market planning.
- **AI-powered robotics and automation** that reduce labour shortages in dairy and horticulture operations.
- **Computer vision systems** for livestock welfare monitoring.
- **Generative AI platforms** that integrate weather, soil, and pricing data to provide actionable decision support.

However, Canada captures just 3 percent of global agtech venture investment, compared to 55 percent in the US. To close this gap, AI investments must be paired with policy reforms that address farm-level realities — not just high-level innovation goals. That means ensuring affordability, data trust, connectivity, and skills development.

Barriers to Safe and Effective AI Adoption

Connectivity Gaps
Only 78 percent of rural Canadians have access to high-speed internet. For AI tools dependent on real-time data and remote updates, this is a structural barrier. Programs such as the Universal Broadband Fund are crucial, but progress must accelerate. AI cannot thrive where connectivity is unreliable.

Data Governance and Trust
Farmers remain hesitant to share data because ownership, privacy, and reuse rules are unclear. Current privacy laws (like PIPEDA) do not cover most non-personal agricultural data. Without a trusted governance model, farmers fear their operational data may be misused by large corporations or for regulatory compliance beyond their consent.

Financial Barriers and ROI Uncertainty
AI-enabled tools often require high upfront investment and recurring subscription costs. Farmers typically expect a threefold return within five years; many AI systems require longer timelines to demonstrate value. Limited access to financing and short-term federal funding cycles further discourage adoption.

Skills and Knowledge Gaps
Canada faces a growing deficit of workers with digital agriculture expertise. Traditional agricultural training often excludes AI, data analysis, and systems integration. Upskilling current producers and training new entrants is essential to realize AI's benefits safely and effectively.

Fragmented Policy Landscape
Digital and AI initiatives remain dispersed across multiple departments and programs (AAFC, ISED, NRC, PrairiesCan, etc.), often without clear coordination or measurement of impact. A national AI-in-agriculture framework could harmonize these efforts.

Lessons from International Models

United States – Structured Public-Private Collaboration
The US Small Business Innovation Research (SBIR) and Technology Transfer programs require partnerships between startups, universities, and rural communities, ensuring farmer participation from the outset. Canada could replicate this structure through ISED and AAFC joint programs, emphasizing co-development of AI tools and farmer-centric design.

Australia – Flexible Federal-Provincial Coordination
Australia's Digital Foundations for Agriculture Strategy sets national goals but allows regional tailoring, with 50 percent rebates for Internet of Things (IoT) installations and robust connectivity programs. A similar approach under the Sustainable Canadian Agricultural Partnership could align federal funding while empowering provinces to pilot region-specific AI solutions.

Netherlands – Extension and Advisory Support
The Dutch government embeds digital training and advisory vouchers into its agricultural policy, funding both technology acquisition and farmer education. Canada could adopt this model to expand AI-focused extension services, ensuring farmers receive continuous support.

France – Startup-Driven Innovation and Tax Incentives
France's €2.3 billion *France 2030* plan combines tax credits, public R&D investment, and innovation vouchers to scale agtech startups. Canada should consider similar incentives to retain AI intellectual property and accelerate the commercialization of homegrown solutions.

United Kingdom – Data Monetization and Regulatory Innovation
The UK's Farming Innovation Programme explores blockchain-enabled sustainability tracking and outcome-based payments. A Canadian pilot could explore AI systems that reward data sharing and emissions reduction performance through verified, transparent models.

Policy Pathways for Canada's Updated AI Strategy

Responsible AI and Data Governance

1. **Develop a Pan-Canadian Agricultural Data Framework**
    - Clarify ownership, consent, and sharing standards for farm data.
    - Align with AI ethics principles — transparency, explainability, and accountability.
    - Involve farm groups, agtech firms, and Indigenous communities in co-design.
2. **Create an "Ag Data Trustmark" Certification**
    - Certify agtech products that meet clear standards for security, transparency, and interoperability.
    - Model this initiative on the Ag Data Transparent program in the U.S.

3. **Integrate AI Ethics into Funding Programs**
    - Require AI impact assessments for projects supported by *AgriInnovate*, *CAAIN*, and *Protein Industries Canada*.
    - Establish a standing ethics advisory group on AI in agriculture.

4. **Assign clear accountability for the certification and governance process**
    - Designate a lead federal agency (e.g. ISED, in partnership with AAFC) to oversee the development, implementation, and continuous improvement of ag data certification and governance standards.
    - Establish mechanisms for transparent public reporting on program compliance, certification status, and outcomes, through annual or regular updates.
    - Ensure that certification standards and governance processes are adaptable, evidence-based, and kept responsive to evolving technology and farm realities.

<u>Commercialization and Scale-Up</u>

1. **Launch a National Agtech Accelerator Network**

    - Under ISED and PrairiesCan, fund regional AI-in-agriculture accelerators linked to smart farm testbeds.
    - Provide equity-free seed funding and mentorship for AI startups.

2. **Introduce AI Innovation Vouchers for Farmers and SMEs**

    - Offer up to $50,000 to integrate AI solutions or conduct pilot testing on farms, modeled on France's digital adoption vouchers.

3. **Align AgriInnovate and CAAIN Programs**

    - Prioritize multi-partner projects where AI researchers, startups, and producers co-develop deployable tools.
    - Simplify application processes and extend project timelines to reflect the multi-year ROI of AI technologies.

4. **Provide support across the commercialization lifecycle**

    - Facilitate effective transitions from pilot projects and demonstrations to full market scale by connecting producers, researchers, and startups through targeted acceleration and mentorship programs.
    - Streamline regulatory approval processes and harmonize requirements where possible, reducing fragmentation across jurisdictions and shortening time-to-market for validated innovations.
    - Dedicate resources to cross-sector partnerships that align research expertise, technical development, and direct farmer feedback, ensuring products reflect on-farm realities and can scale for diverse operations.

Skills and Talent Development

1. **National Digital Agriculture Skills Strategy**
    - Co-developed by AAFC, ISED, and Employment and Social Development Canada (ESDC).
    - Expand programs like Digital Agriculture Fundamentals and Agriculture Technology Leadership programs from Palette Skills and college microcredentials in AI, robotics, and data analytics.

2. **Support Smart Farm Learning Hubs**
    - Scale models like EMILI's Innovation Farms (Manitoba) and the Pan-Canadian Smart Farm Network to every province.
    - Provide dedicated funding for student placements, extension services, and on-farm AI demonstrations.

3. **Promote Inclusive Workforce Development**
    - Target under-represented groups (women, Indigenous communities, newcomers) for AI and agtech training programs.

4. **Support building robust local and regional learning ecosystems**
    - Encourage collaboration between local farmers, educators, and regional agricultural organizations to create ongoing, community-based learning networks and mentorship programs.
    - Invest in flexible educational infrastructure, including demonstration farms, hybrid (online/in-person) training formats, and regional knowledge hubs that can respond to changing technology, market needs, and local priorities.
    - Facilitate continuous feedback and evaluation to ensure learning opportunities remain relevant and effective.

Enabling Infrastructure and Ecosystem Support

1. **Accelerate Rural Connectivity and Edge Computing**
    - Integrate the needs of agriculture into Canada's 5G and satellite broadband planning.
    - Support pilot projects for low-earth-orbit connectivity on farms.

2. **Fund AI Testbeds and Safe Deployment Zones**
    - Expand existing smart farms into trusted AI testing environments for risk assessment, performance validation, and safety audits.

Measuring Impact and Accountability

To ensure progress under the renewed AI Strategy, EMILI and CAPI recommend that ISED adopt measurable indicators specific to the agriculture and agri-food sector, including:

- Share of farms using AI-enabled technologies by 2030.
- Number of Canadian agtech firms achieving commercial scale (>$10 million revenue).
- Rural connectivity coverage (percentage of farms with >50 Mbps broadband).
- Participation in AI skills programs and microcredentials.
- Reported trust levels in agricultural data governance frameworks.
- Publish all metrics through annual public reviews, incorporate open feedback for policy improvement, and clearly assign responsibility for collection, reporting, and action.
- Convene interdepartmental working groups from other federal departments and provinces for integrated delivery and reporting.

A Time to Act

AI represents a once-in-a-generation opportunity to transform Canadian agriculture into a cornerstone of the digital economy. With the right policy architecture — rooted in safety, trust, and innovation — Canada can become a global leader in agricultural AI that balances economic growth with ethical integrity.

Collaboration between industry, research, and policy can create a roadmap for responsible innovation. The updated *Pan-Canadian Artificial Intelligence Strategy* should seize this moment to make agriculture a national showcase for how AI can strengthen prosperity while safeguarding people, data, and the environment.

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