



BUSINESS COUNCIL
OF ALBERTA



The Future of Agriculture in Alberta: How Technology is Advancing the Industry

Kim McConnell
BCA Special Advisor

**DEFINE
THE DECADE**

Discussion Paper Series

Copyright

© Business Council of Alberta 2023

Report Citation

"The Future of Agriculture in Alberta: How Technology is Advancing the Industry." Kim McConnell. Define the Decade Discussion Paper. Business Council of Alberta. May 2023.

About the Business Council of Alberta

The Business Council of Alberta is a non-partisan, for-purpose organization dedicated to building a better Alberta within a more dynamic Canada. Composed of the chief executives and leading entrepreneurs of the province's largest enterprises, Council members are proud to represent the majority of Alberta's private sector investment, job creation, exports, and research and development. The Council is committed to working with leaders and stakeholders across Alberta and Canada in proposing bold and innovative public policy solutions and initiatives that will make life better for Albertans.

Land Acknowledgement

In the spirit of truth, reconciliation, and respect, we honour and acknowledge the lands upon which we live and work as guests, including the traditional territories of the First Nations in Treaties 6, 7, and 8 and the citizens of the Metis Nation of Alberta. We thank the First Peoples of this land, which we now call Alberta, for their generations of stewardship of the land, and we seek to walk together in the spirit of truth and reconciliation to build a shared future for all in Alberta.

This document reflects the views of the author based on their own research and expertise. This is published by the Business Council of Alberta. It may not necessarily reflect the perspective of all BCA member companies, and should not be read as the position of any one member or of the Council itself.

About the Author

Kim McConnell is a founder and the former CEO of AdFarm, one of the largest agricultural marketing communications firms in North America.

Over the years, Kim has led national and international brand and marketing assignments for many respected national and international agriculture and food companies and has been the catalyst behind many major industry ventures including an initiative to build greater public trust in food and farming.

Kim is also the recipient of many national business awards including "Agri-Marketer of the Year" and the Canadian Youth Business Foundation "Mentor of the Year".

In 2012 he was inducted into the Canadian Agricultural Hall of Fame. And in 2017 he was appointed a Member of the Order of Canada, Canada's highest civilian award.

Kim remains a director on a number of corporate, industry and volunteer boards and is a mentor to emerging executives and fast-growth companies. Kim and his family live on an acreage on the edge of Calgary. Kim is passionate about agriculture, food, youth and the entrepreneurial spirit.



Kim McConnell
BCA Special Advisor

Agriculture has a vital role in Alberta's economy, and technology is changing the way farmers manage and grow their crops, livestock, soil, and grasslands.

Forget the stereotypical image of agriculture: it's not your grandparents' farm. There are no overalls, red barns, or pitchforks. Today's farms are high-tech and high-touch, and the future promises to hold even greater opportunity.

Innovation is the lifeblood of many industries, and agriculture is certainly no exception. For more than a century, Canadian research has developed new crops such as canola; bred cereal varieties that have become the global standard in breadmaking and malt barley; and produced animal genetics that are sought after worldwide. Prairie farmers have also designed and manufactured farm equipment that revolutionized seeding and fertilizer application.

Decades ago, we pioneered new production practices such as zero tillage and banded fertilizer applications—sustainability practices that farmers in many countries around the world are adopting. Today, agtech—tech solutions applied to the agri-food sector—has captured the attention of investors, farmers, and the public.

In this paper, we will explore some of the technological advancements and how they are used in farming today, as well as a glimpse of what's on the horizon. This paper concludes with how we can fully realize the opportunity technology presents for the agriculture sector in Alberta.

The Technologies



Precision Agriculture

Precision agriculture is a farming management concept that uses technology to precisely map and manage crop and soil data.

In Alberta, precision agriculture is used to increase the efficiency and productivity of farm operations. Tools like yield monitors, GPS mapping, and variable rate technology (VRT) allow farmers to measure and respond to the variability of their land and crops. By monitoring and analyzing data from soil sensors, weather stations, and other sources, farmers can make more informed decisions about fertilization, irrigation, and planting, which increases yields and reduces waste, ultimately improving the sustainability of agricultural production and improving profitability.



Livestock

The livestock industry is also advancing with technology and best management practices (BMPs).

Today, Alberta beef has one of the smallest carbon footprints globally, and our dairy cattle emit fewer greenhouse gases (GHGs) per kilogram of dairy products than the global average. Through technology such as advanced genomics and selective breeding, our livestock industry—from cattle to poultry—is enhancing productivity, efficiency, and nutrition while leading the world in reducing emissions at the same time. The livestock industry maximizes emissions reductions by combining this technology with BMPs such as rotational grazing and other herd and grassland management practices that capture and store carbon and reduce emissions. Finally, anaerobic digestors are gaining traction as they turn manure into fuel and compost.



Fertilizer

Like livestock farmers, crop farmers are also committed to reducing agricultural emissions, with a significant focus on reducing the emissions from fertilizers.

Smart fertilizers that adapt to crop and climate conditions, precision application, 4R nutrient stewardship, precision manure applications, and new phosphorous fertilizer products made from city waste are just some of the advancements happening today, with more on the horizon.



Carbon Sequestration

Farmers increasingly recognize the impact that climate policy could have on their operations. They recognize that carbon is likely to become an asset on their balance sheets, and with the support of digital technology, genetics and best management practices, agriculture will be a significant and positive contributor to Alberta's net zero goals.



Water Management

In addition to emissions reduction efforts, water management is an important component of sustainable agriculture.

Agriculture is a big user of water; it is critical to the production of crops and animals as well as Alberta's growing food processing industry. Good water management is grounded on good data and science.

The future will see an expansion in Alberta's irrigation infrastructure, guided by technologies that enhance water utilization, storage, and efficiency.



Drones

Farmers are using drones to capture high-resolution images and valuable data that save time and increase efficiency.

In Alberta, drones are increasingly used in agriculture to monitor crop health, detect weeds and pests, inspect irrigation systems, monitor livestock, map fields, and assess natural disasters. They are also beginning to be used to apply fertilizer and crop protection products.



Robotics

Robots are playing an increasingly important role in agriculture, particularly in repetitive, dangerous, or difficult tasks for humans to perform. For example, robots milk cows and feed and water animals. Robotic farm equipment equipped with GPS mapping systems can be programmed to plant and harvest crops with precise accuracy, reducing the need for manual labour and increasing yields.

The future is likely to see swarms of autonomous robots doing a variety of important production tasks.



Traceability Tech

Consumers are increasingly interested in how their food is produced, processed, and sold.

Blockchain technology is being tested in agriculture to increase transparency and traceability in supply chains. This technology allows the agri-food industry to track their products from farm to table, providing consumers with information about the origin of their food and ensuring the integrity of food safety standards.



Artificial Intelligence (AI), Machine Learning (ML), and Internet of Things (IoT) Tech

AI, ML, and IoT are being used to analyze large amounts of data and provide farmers with insights to help them make better decisions.

For example, farmers can use AI and ML algorithms to predict crop yields and identify areas of the field that may be suffering from stress or disease. Equipment technologies like “see & spray” are being trained to identify and control pests and diseases efficiently and effectively. And IoT is connecting farm equipment, sensors, and accounting and traceability software, allowing farmers to make better, more accurate, and more profitable decisions.



New Crops and New Markets

Traditionally, Alberta has grown crops like wheat, barley, and canola. These will continue to be our primary crops, but technologies, genetics, and new breeding techniques will further enhance yield and performance.

The future will also see the addition of new crops like camelina and carinata. These crops are ideal as feedstock for the renewable fuels and sustainable aviation fuel markets—markets that are expected to grow in the near future.



Greenhouse, Vertical Farms, and Indoor Farming

With its abundant sunlight and water, Alberta is seeing increased investment in indoor farming operations. And this growth is just beginning.

Fruits and vegetables produced in these facilities are meeting the demand for more locally sourced and flavourful produce. And technology advancements in genetics, robotics, and production practices are making these operations increasingly viable and attractive to a new type of farmer and investor. The future will also see an increase in the number of insect and fish farming operations, and once again, technological advancements are making this happen.



Processing Advancements

Increasingly, Alberta’s opportunity in agriculture is in value-added agriculture—processes that turn commodity products into food ingredients and even branded consumer products that increase the value of the raw agriculture commodity. As a result, Alberta is attracting expanded investments in processing facilities to meet domestic and global demand.

Alberta’s future will see the energy and agriculture sectors working together to produce innovative, cost-effective, and profitable solutions for biofuels from waste like animal fats, off-grade canola, and new-to-Alberta crops like camelina.

The future will also see a greater focus on fractionation, where canola and pea seeds are dissected to provide novel ingredient solutions for use in aquaculture feed, plant-based foods, and personal care products.

The Opportunity

The impact of new technology adoption on Alberta's agriculture industry cannot be overstated. Innovation and new technology will further enhance yields, quality, and production efficiency. It can also improve profitability and ensure Alberta farmers maintain competitiveness with global competitors.

However, significant barriers prevent technology from fully transforming agriculture in Alberta: regulatory approval, infrastructure development, and investment.

Among them, regulatory approval is famously slow in Canada compared to other jurisdictions. Regulations also differ between countries. This limits access to technology and tools, putting Albertan and Canadian agriculture at a disadvantage.

Most regulatory obstacles facing technological advancement rest with the federal government. However, provincial governments can assist by ensuring the regulatory processes that do fall under their responsibility are streamlined and efficient. The Alberta government can also encourage federal counterparts to make science-based decisions and move more quickly on regulatory approvals. For their part, municipal governments can help by improving their processes for issuing construction and other permits.

Infrastructure is another challenge—specifically, broadband capacity, rail transportation, and Port of Vancouver limitations are significant challenges that need improvement. Many new digital technologies require greater broadband capacity to operate at maximum performance, and 21st-century infrastructure in rural areas is sorely lacking. In addition, operational issues (including labour shortages and loading vessels in the rain) compound capacity and efficiency issues, harming Alberta and Canada's reputation as a dependable supplier.

Most infrastructure projects (like port expansion, tunnels, and broadband buildout) will require long-term commitments involving significant public investments. Provinces like Alberta could, and should, assist with projects requiring significant public investments, as the benefits that flow from them will support agriculture and other industries operating in the province.

Investment is a third challenge. Broadly speaking, this includes investments that support the discovery and commercialization of new agtech ventures, and investment by farmers and industry participants to purchase these technologies. As with other digital technologies, there are early-stage challenges in attracting investment in agtech. But a larger issue is attracting investment in the \$20 million - \$100 million range—the amount of financing needed to move up the value chain in areas like greenhouse production and value-added processing.

With a [\\$226 million investment](#) in 2022, Canada's agtech industry is hot and will continue to be for many decades. Start-ups across all jurisdictions are vying for investment and aggressively encouraging their province and country to establish themselves as the ideal home location. Thanks to the Government of Alberta and economic development initiatives in cities and communities, Alberta is holding its own and becoming an attractive location for investment and employment growth.

In conclusion, technology is advancing the way agriculture is practiced in Alberta. Genetics, precision agriculture, drones, robotics, and traceability technology are just a few examples of how Alberta farmers are using technology to increase efficiency, productivity, and transparency in the agriculture sector. These advances are helping them to make better decisions, reduce waste, and improve the quality of their products. As technology evolves, it will play an increasingly important role in shaping the future of agriculture in Alberta and around the world.



1600, 635 8th Ave SW
Calgary, AB T2P 3M3

BusinessCouncilAB.com
info@businesscouncilab.com

Define the Decade is a vision for the future of Alberta and a roadmap to get there. To learn more about this project and how you can get involved, please visit DefinetheDecade.com