

THE FUTURE OF DIGITAL AGRICULTURE IN NEW BRUNSWICK

OPPORTUNITIES AND CHALLENGES



**A REPORT PREPARED FOR
THE AGRICULTURE ALLIANCE OF NEW BRUNSWICK**

BY

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July 2024

Contents

- A. INTRODUCTION 3**
- B. INTERVIEW PROCESS 3**
- C. SUMMARY OF INTERVIEW RESULTS 4**
 - i. Overview of Operations 4**
 - ii. Familiarity With Digital Agriculture Related Terminology 4**
 - Chart 1: Terminology and Definitions 5**
 - iii. Current and Forecasted Use of Digital Technologies 6**
 - iv. Motivations for the Adoption of Digital Technologies 7**
 - v. Barriers to the Adoption of Digital Technologies 8**
 - Chart 2: Barriers to the Adoption of Digital Devices 8**
 - vi. Workforce Development Issues 9**
 - Infographic 1: The Education and Training Ecosystem 10**
 - vii. Environmental Sustainability Efforts and Challenges 10**
- D. REGIONAL COLLABORATION 11**
- E. RECOMMENDED ACTIONS 11**
- F. FINAL THOUGHTS 12**
- APPENDIX A: Background Paper 14
- APPENDIX B: List of Interviewees 22

A. INTRODUCTION

Digital agriculture is an emerging global force and playing an increasing role in Atlantic Canada. The growth of digital agriculture is being fueled by two primary forces: 1) the opportunity to increase the profitability of both individual food production enterprises and the sector as a whole; and 2) the need for data to demonstrate to consumers the food industry's commitment to sustainable agriculture practices. Digital technologies are recognized as foundational to the next major wave of agriculture productivity and in order to realize its full potential it will be important that digital solutions take into account the entire production system. Critical to its deployment will be a laser focused effort on upskilling and training the existing and future workforce.

In January 2024 the Agriculture Alliance of New Brunswick (AANB) <https://fermenbfarm.ca/> retained the services of John Kershaw (JDK Consultancy) to interview a number of New Brunswick growers, representatives of the agriculture service sector, and members of the academia, to assess the current state of digital agriculture in the province. Following the interview process, AANB and Living Labs <https://lvnbll.ca/> jointly convened a meeting in Fredericton (March 12) to further the discussion on digital agriculture in the province. At the meeting a blend of New Brunswick growers and service sector representatives, regional academic leaders and government officials shared their perspectives on the current and projected role of digital agriculture, in the context of the future growth and sustainability of the provincial and regional agriculture sectors.

This report provides a synopsis of the aforementioned interviews and March 12th meeting. Based on the interviews and outcomes of the March 12th, the report offers a number of key action items deemed important for advancing digital agriculture in both the province and the region as a whole.

B. INTERVIEW PROCESS

During the month of March of 2024, a number of interviews were held with New Brunswick growers and local service sector representatives. Interviews were also conducted with a number of college and university representatives as well as pertinent national organizations with digital agriculture roles in New Brunswick.

The people interviewed are considered early adopters of digital technologies in New Brunswick's agriculture sector and offer a snapshot of what is occurring in the province from a digital agriculture perspective. The growers interviewed were largely comprised of the more advanced enterprises in the province from the perspective of size and scale of their operations. The growers also represented a diversity of crop and livestock operations located across the province.

In order to facilitate the process and provide context, interviewees were provided with a background discussion paper on digital agriculture, which included a copy of the interview questionnaire. The discussion paper which included the sample questionnaire can be found in **Appendix A**. Please note that questions used to interview the service sector representatives and members of academia were individually tailored to their roles. **Appendix B** provides the list of people interviewed. The slide deck used by the consultant at the March 12th meeting will be sent to the participants by the AANB.

The majority of interviews were conducted by the consultant in person. A limited number were conducted virtually (zoom) due to distance and/or convenience for the interviewee.

The interviews focused on the following key areas of inquiry:

1. Overview of the interviewee's operations and/or role.
2. Familiarity With Digital Agriculture Related Terminology.
3. Major challenges.
4. Current and Forecasted Use of digital technologies.
5. Motivations for the Adoption of digital technologies.
6. Barriers to the Adoption of digital technologies.
7. Workforce Development Issues.
8. Environmental Sustainability Efforts and Challenges (Greenhouse Gas (GHG) / Carbon Sequestration / Climate Resiliency).

C. SUMMARY OF INTERVIEW RESULTS

Following is a summary of the results of the interview process.

i. Overview of Operations

As noted earlier in this report, the growers interviewed represented the more advanced agriculturalists in New Brunswick in terms of the size and scale of their operations. They also represented a diversity of crop and livestock operations, including but not limited to cattle, poultry/eggs, orchard, potatoes, maple sugar, blueberries, and cranberries. As noted, the size and scale of the subject operations were impressive, and represented significant levels of production, as well as major capital and operational investments. The growers' passion for agriculture was clearly evident as was their propensity to base their investment decisions on a *trusted* source of information whether that source be a neighbour who has validated a particular methodology or device or a long-term partnership with a service provider.

A key challenge for the majority of the growers was access to labour in general, and access to skilled labour specifically. A number of growers were accessing the Foreign Workers Program and/or employing recent immigrants to the province. As will be noted later in this report, a number of the growers cited that a key barrier to their adoption of digital agriculture devices was access to people skilled in either the use of the devices or in the servicing of them.

One of the issues arising from the interviews was the current demographics of ownership and related succession issues. As growers get ready for retirement, it is clear that more succession planning needs to be considered to ensure a successful transition to new ownerships.

A key discussion point relating to the overview of farm operations is that the historic image of farming is highly outdated, and may be related to some of the challenges the agriculture sector has in recruiting new ownership and workforce talent into the sector. The reality is the sector is comprised of highly mechanized and sophisticated food production enterprises operating at an industrial scale and offering a myriad of highly modern career opportunities.

ii. Familiarity With Digital Agriculture Related Terminology

The majority of growers interviewed were familiar with terminology such as sustainable agriculture, precision agriculture, digital agriculture, regenerative agriculture and smart farms. For the purposes of discussions during the interviews, it was noted that *sustainable agriculture* comprises three primary elements: 1) economic sustainability – profitable food production enterprises; 2) social sustainability –

the health and well being of growers, their families and their communities (quality of life); and; 3) environmental sustainability – conducting agriculture while protecting the environment.

Precision farming was noted as essentially being the use of information derived by digital or other means, to help a grower more precisely target and minimize inputs to production with a view to increasing yield (quantity and quality) at lower cost.

Digital agriculture was identified as the use of digital devices to: 1) generate data used to better inform production related decisions; 2) monitor operations; or 3) remotely operate machinery.

Regenerative agriculture is essentially an agriculture practice that seeks to improve economic viability while also improving soil, water and air quality, enhance ecosystem biodiversity, produce nutrient-dense food, and store carbon to help mitigate the effects of climate change. These practices include the use of cover crops and innovative tilling practices to minimize soil disruption, to cite a couple of examples.

Smart Farms can be considered as the penultimate application of *precision, digital and regenerative* agriculture practices, and thus is synonymous with *sustainable agriculture*, on an individual enterprise basis.

Although certainly not an exhaustive listing of website definitions, Chart 1 below provides a number of links offering a basic understanding of each of these terms.

Chart 1: Terminology and Definitions

| TERM | DEFINITIONS |
|---------------------------------|--|
| Sustainable Agriculture | <p>https://en.wikipedia.org/wiki/Sustainable_agriculture#:~:text=The%20term%20%22sustainable%20agriculture%22%20was%20defined%20in%201977,life%20for%20farmers%20and%20society%20as%20a%20whole.</p> <p>Sustainable agriculture Definition, Practices, Methods, Examples, & Facts Britannica</p> |
| Precision Agriculture | <p>https://en.wikipedia.org/wiki/Precision_agriculture</p> <p>Precision Ag Definition International Society of Precision Agriculture (ispag.org)</p> |
| Digital Agriculture | <p>Digital agriculture - Wikipedia</p> <p>What Is Digital Agriculture? - DTN</p> |
| Regenerative Agriculture | <p>https://en.wikipedia.org/wiki/Regenerative_agriculture</p> <p>https://www.weforum.org/agenda/2022/10/what-is-regenerative-agriculture/</p> |

One of the key outcomes of the March 12th workshop in Fredericton was for the region to consider the adoption of a standard lexicon for such terms as a means of ensuring consistency in understanding and effective communications at all levels.

Precision, digital and *regenerative* practices are all targeted toward achieving the ultimate goal of *sustainable agriculture*, and are aimed at either enhancing profitability (i.e., reducing costs or increasing yield), reducing the workload on growers, or meeting environmental related requirements.

One of the slides found in the authors slide deck provides a further illustration of how the various terms relate to each other. This slide deck will be circulated by the AANB to participants at the March 12th meeting, and to those people interviewed by the consultant.

iii. Current and Forecasted Use of Digital Technologies

The growers and service sector representatives interviewed identified a wide range of current uses of digital devices. These devices were either to gather and analyze data, monitor operations, or remotely operate machinery. While the focus of the interview process was on the application of *digital* devices, it's worth noting that the majority of operations were also highly automated in many aspects of their operations.

An overview of some of the digital applications *currently* in use in New Brunswick are listed below.

- Data linked directly to phones to allow for remote monitoring of crop or livestock health and growth performance.
- Sensors and automation to facilitate the management and production of poultry and eggs.
- Setting the perimeter of fields using GPS to: 1) facilitate autonomous harvesting and/or spraying; or 2) contain livestock (cattle).
- Devices to generate data with a view toward creating soil and yield mapping (e.g., nutrient requirements/historic yield performance and projections). Includes optical spectroscopy and multi spectral analysis to facilitate real time assessments of crop growth requirements
- Digitally derived data to facilitate variable rate applications (VRA) of water, fertilizers, pesticides fungicides et cetera.
- Digitally tagging cattle to track the overall production cycle, including remotely measuring feed and weight performance.
- Drone and/or satellite imaging to facilitate remote scouting efforts related to assessing yield and/ or potential disease or pest issues.
- Digital sensors to monitor production processes (e.g., pressure in maple sugar lines / early frost warning systems in cranberry fields).

The growers and service sector individuals interviewed also offered observations on where they predicted increases in the use of digital agriculture, as follows:

- Tractor mounted multi spectral cameras that scan the ahead crops and automatically adjust sprayers to facilitate variable rate applications in real time.
- Drones to scout fields and to apply fertilizers or other treatments using variable rate applications.

- Contour mapping to facilitate a higher degree of precision agriculture.
 - The use of satellite imagery and data to scout fields and assess yield (especially as resolution and calibrations improve).
 - Remote and autonomous cattle weighing devices (e.g., weighs cattle while drinking versus herding through weighing stations).
 - Robotic and AI applications.
 - Applying programs such as NESTT (National Environmental Sustainability and Technology Tool) in poultry and egg production to measure, monitor and manage the environmental impact of farms (e.g., feed and water use, energy use manure management etc.)
- <https://www.eggfarmers.ca/2023/11/the-top-three-reasons-why-egg-farmers-are-using-nestt/>

It should be noted with the application of digital technology, cyber security awareness and protection of data and systems needs to be considered as part of application development and implementation.

iv. Motivations for the Adoption of Digital Technologies

The primary motivation for the adoption of digital agriculture related applications was by far to enhance *profitability*. Growers and others in the agriculture sector were clear that reducing costs and/or increasing yield were the primary factors in whether to invest in new technologies. This was the motivating factor for growers whether they be involved in crop or livestock production, or both. With respect to yield, the motivation was twofold: increase both the *quantity* and *quality*, with the latter often fetching higher prices and thus improving profitability.

A second and important motivation for the adoption of digital devices cited by a small number of growers interviewed related to *health and quality of life*. These growers noted that the ability to remotely manage their operations helped remove them from the normal daily grind of managing their on-site operations.

The growers interviewed consistently cited narrowing profitability margins as a motivation for looking at new and innovative ways to improve production. The narrowing profitability margins were associated with the rising costs of production inputs (e.g., fertilizer costs) coupled with rising costs associated with meeting environmental requirements. In the latter case, growers recognized that consumers were driving major retailers to make commitments that their food products were being sourced from food production enterprises using sustainable agriculture practices, including, but not limited to water conservation and protection, animal husbandry, greenhouse gas emissions and carbon sequestration. A number of growers noted that their buyers were increasingly demanding more data to demonstrate the grower was employing sustainable agriculture practices. All those individuals interviewed, whether they be grower, a service sector representative or a member of an academic institution, emphasized that they expect this trend of demanding more data from the food production sector to demonstrate sustainable agriculture practices to increase over time.

When considering the motivations noted above, it is worth relating back to the aforementioned definition of sustainable agriculture as being a blend of economical, social and environmental best practices. Today's growers, and indeed the entire agriculture sector, will increasingly be challenged to reach the ideal balance between profitable enterprises, healthy life styles, and environmental sustainability. A number of the conversations held during the interview process centred on the issue of growers being asked to absorb the entire burden of meeting consumers/society's needs and expectations associated with environmental sustainability practices. Growers noted there are real costs associated with meeting

the growing number of environmental regulations and while they are committed to meeting these challenges, they expect governments to strike the right balance between the growers need to be profitable and government environmental policy and financial supports to the sector, to facilitate the required transitions.

v. Barriers to the Adoption of Digital Technologies

Growers and other sector representatives cited a number of barriers to the adoption of digital agriculture devices and practices. While digital agriculture may represent a significant effort toward the ultimate goal of sustainable agriculture, as defined above, there are nonetheless impediments to adoption. A number of the barriers to adoption cited during the interviews are noted in Chart 2 below, along with a brief explanation.

Chart 2: Barriers to the Adoption of Digital Devices

| Barrier to Adoption | Explanation |
|---|--|
| Cellular Service/Internet Access | A small number of growers noted the absence of reliable cellular coverage in their area of operation. It was again highlighted during the review of the draft report. |
| Cost Versus Return on Investment (ROI) | Growers must take calculated risks when adopting new digital technologies. Will the investment lead to improved profitability, and will the ROI occur within the lifespan of the device being purchased? |
| Scale of Enterprise | Generally, a food production enterprise must reach a certain scale of production before digital agriculture practices, which cost more, are economical to deploy. |
| Knowledge Transfer | Growers cited the need to better understand the benefits of digital agriculture practices. Who do they trust and where are such devices tested and validated? Has research been conducted on the true economic benefits of the digital applications? |
| Workforce | The unavailability of skilled workers to deploy and/or service digital agriculture practices is a significant barrier. |
| General Awareness | A number of growers cited the fact they are unaware of what digital agriculture devices are available and which ones have been tested and proven. There is no local or regional venues or conferences for them to learn from. |
| Service Sector Support | Many growers and others interviewed noted that lack of service sector support in the area of digital agriculture practices. Devices may be available but there is no one local to service them, leading to expensive downtime when things go wrong. |
| Financial Support | The need for government financial programs to be better tailored to promote the adoption of digital agriculture devices and practices was often cited. This cited need also applied to the Canadian banking sector. Ensuring a level playing field across regional jurisdictions was also noted. |

| | |
|-----------------------------------|--|
| Program Integration | The incompatibility of program software was often cited as a deterrent to the adoption of a digital device. (e.g., tractor software incompatible with sprayer VRA related software). |
| Sector Specific Technology | Growers noted the need for agriculture specific technologies, as opposed to the sector being forced to adapt existing technologies which don't work as effectively or efficiently (e.g., humidity sensors designed for buildings don't work in greenhouses with high humidity levels). |

vi. Workforce Development Issues

The availability and skill set of workers was perhaps the most often cited barrier to the adoption or use of digital agriculture devices and practices. An often-heard refrain was that having million-dollar harvester with more technology than the first space shuttles is ineffective if the operator fails to collect the data correctly.

The individuals interviewed also made it clear that the agriculture workforce challenge is not limited to the domain of digital agriculture. Indeed, many cited their belief that the historic or stereotypical image of agriculture still prevails within society, and is uncondusive to attracting young people into the sector.

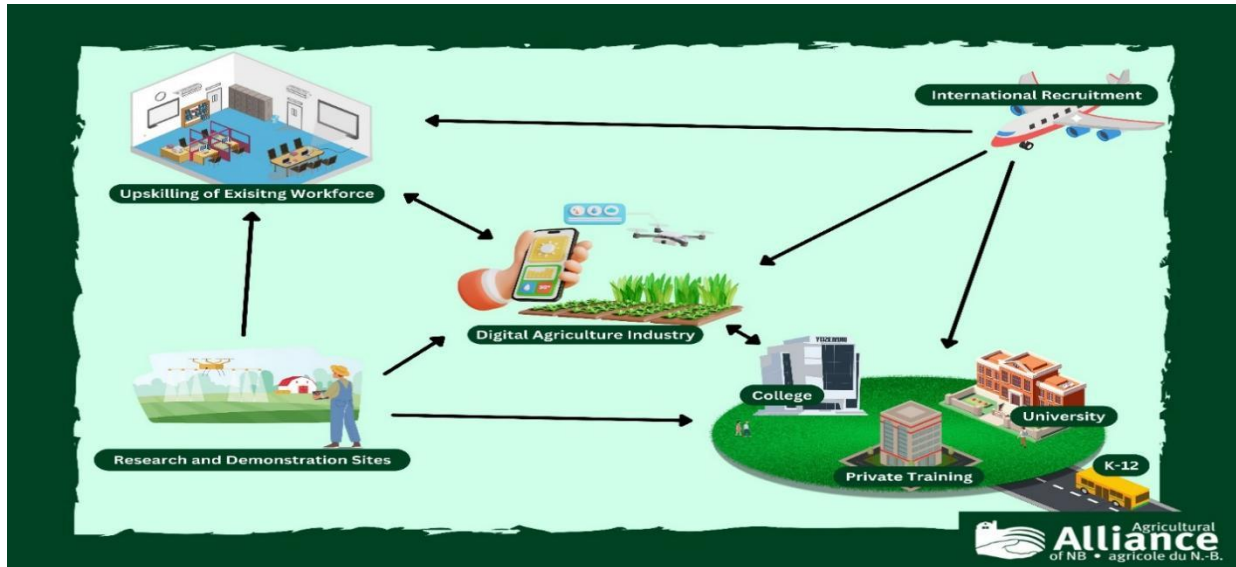
While not specific to digital technology a number of growers noted they actively use the Federal Foreign Workers program while others advised they employ recent immigrants. Although some of these growers noted that language was sometimes a barrier to communication, they were quick to underline the fact that the work ethic of these individuals more than made up for any deficiencies in this regard.

In addressing both the current and anticipated workforce challenge, a number of potential solutions were cited, including:

1. A campaign to modernize the image and brand of agriculture with a view to better attracting young talent into the sector (social media/ you tube / vignettes).
2. A career awareness campaign targeted at recent college and university graduates.
3. Upskilling opportunities for the existing workforce.
4. Diversifying recruitment efforts to other disciplines, such as engineering, computer science, forestry, and business.
5. A heightened elementary school-based program aimed at changing the image of agriculture and building students' awareness of the diversity of career opportunities within the sector.
6. Promoting coop and apprenticeship programs to expose young people to, and recruit them into the sector.

The challenges noted above demand a focused education and training response. Building awareness of career opportunities in agriculture must begin in the K-12 system. Focused education and training programs at the post secondary level must then be made available on the wide range of professions required in the industry. These programs will need to be delivered by a blend of public (community colleges/universities) and private learning institutions. Upskilling of the existing agriculture workforce will be critical and the industry will also continue to draw from the international workforce. In summary, in preparing for the growth of the digital agriculture workforce, it is important to fully understand the education and training ecosystem, as illustrated in the infographic below:

Infographic 1: The Education and Training Ecosystem



vii. Environmental Sustainability Efforts and Challenges

Based on the interviews conducted, it is clear growers and others in the sector are more than willing to do their part to achieve the goal of environmentally sustainable agriculture practices. The sector is already employing more and more precision, digital and regeneration agriculture practices. Academic institutions are also conducting a growing amount of research in these areas in collaboration with industry players. Efforts to reduce greenhouse gas emissions and to sequester carbon are growing. As noted earlier, the food production value chain as a whole is also moving forward with requiring sustainable agriculture practices with a number of the major retailers now requiring growers to demonstrate their commitment through audits. The number of food retailers labelling their food products as environmentally sourced is also expected to grow with time. It is what consumers are increasingly demanding and retailers will be required to respond or lose their markets.

The move toward environmentally friendly food production will increasingly require growers to produce the data that validates their use of environmentally sustainable agriculture practices. Thus, digital agriculture will, by necessity, play an increasing role in the sector. The challenge will be to ensure the pace of change balances the other key elements of sustainable agriculture, that of economic sustainability (profitability) and social sustainability (health and well being of growers, their families and rural communities). It is therefore critical that public policy and agriculture related financial programs ensure this balance is attainable in a highly predictable and transparent way. Governments and society as a whole need to understand that environmental related regulations need to be tailored in such a way that recognizes food production is an essential human requirement. As governments move to impose environmental regulations this fact needs to be better realized and accommodated. The financial programs of federal and provincial governments, as well as the Canadian banking system, also need to better assist the agriculture sector as it strives to evolve and meet the environmental expectations of both consumers and society as a whole, all the while remaining economically sustainable into the future.

D. REGIONAL COLLABORATION

The interview process and the March 12th meeting in Fredericton conducted under the auspices of AANB and Living Labs attest to the passion and commitment of the people involved in the agriculture sector, be they growers, service sector providers, academic representatives or government officials. Participants in the March 12th event included representatives from across the Atlantic region, all of whom underlined the need for regional collaboration to meet the opportunity of positioning the Atlantic agriculture sector for success going into the future. The opportunity exists to leverage the relatively small size of the Atlantic region into its greatest strategic advantage: the ability to draw everyone together and collaborate in a strategic and meaningful way.

E. RECOMMENDED ACTIONS

The interview process and the March 12th meeting were both intended to act as a catalyst for debate on how to position the New Brunswick and the Atlantic agriculture sectors for success. The participants in these two processes identified a host of ideas on what the strategic priorities should be going forward and on how to proceed. Everyone involved are to be commended for their interest, participation and contributions. All contributions are to be respected and appreciated.

A key underlying theme of the March 12th meeting, was for the Atlantic region to work more collaboratively in meeting its future agriculture related challenges. Indeed, given the overall size and product diversity of the Atlantic agriculture sector, regional collaboration may be imperative to achieve the necessary economies of size and scale with respect to digital agriculture, including data collection and management. The Living Labs model of collaboration across Atlantic Canada serves as a beacon in this regard.

In New Brunswick, AANB has been advised that DAAF is working on an agriculture growth plan that will guide their decisions and investments over the next ten or more years. As the province contemplates priorities for agriculture, it is imperative that the industry identifies its priorities, and contributes to the government's plans to support both the existing and new agriculture food production enterprises, and their support sector.

The agriculture private sector is well aware that over time they will be increasingly be called upon to deliver food products that are deemed to have been produced in an environmentally sustainable manner. They will also be demanded to produce the corresponding evidence. This evidence will be largely founded on data that they themselves produce, in collaboration with their service sector partners. It seems quite obvious therefore that the agriculture sector needs to think strategically about how individual enterprises and the sector as a whole, position themselves to meet the future of sustainable agriculture, as defined earlier in this report.

The key challenge at this point is take all of the ideas offered and prioritize those considered most important to pursue at this point in time. As the saying goes, *to have many priorities is to have none at all*. With this sage advice in mind, a limited number of key actions have been identified for further consideration.

With the above in mind, the following three (3) key initiatives are offered for further debate and action:

1. DIGITAL AGRICULTURE STRATEGY

The New Brunswick agriculture sector develop an industry-led **Digital Agriculture Strategy** to position the industry to meet the growing data requirements related to sustainable agriculture practices. A major pillar to this strategy should also incorporate workforce development to ensure the industry has access to the people and skills required. This component should also include awareness and promotion of career opportunities at the high school and post secondary level.

2. REGIONAL DIGITAL AGRICULTURE COLLABORATION

The New Brunswick industry work with its regional partners to explore the potential to:

- a. Develop an **Atlantic Region Digital Agriculture Strategy including workforce development,**
- b. Create an **Atlantic Smart Farm Initiative** in partnership with academia and government with the mandate to:
 - i. Research and demonstrate smart farm practices.
 - ii. Offer digital agriculture related outreach services.
 - iii. Provide student learning opportunities;
 - iv. Host an annual conference and trade show on digital agriculture.
 - v. Promote Smart Farm practices through-out the region.
- c. Create a **Media Campaign** designed to modernize the brand of the regional agriculture sector and with a focus on enticing recent graduates into the sector.

3. LEADERSHIP AND COLLABORATION

The New Brunswick agriculture industry pursue its provincial and regional digital agriculture efforts under the auspices of the **Living Labs** initiative with a view to building upon the initiative's existing mandate related to best management practices and its regional collaboration network. With the creation of any regional or provincial chairs in digital agriculture it should be predicated on ensuring that all commodity groups are covered under such a mandate.

F. FINAL THOUGHTS

The author would like to thank the Agriculture Alliance of New Brunswick and Living labs for the opportunity to participate in this highly interesting and strategic exercise. I would also like to extend my sincere appreciation to all those people that participated in the interview process and the meeting in March. I wish you all both health and prosperity into the future!

Although most of the information contained in this report is gleaned from the minds of others, as well some related articles, I take full responsibility for its contents of this report, including the recommendations contained in Section E.

I hope the report serves as another step in identifying the way forward toward a sustainable and digitally rich food production sector and I trust it will be received in the positive spirit in which it is intended.

APPENDIX A: Background Paper

DIGITAL AGRICULTURE IN NEW BRUNSWICK



OPPORTUNITIES AND CHALLENGES

February 2024

Contents

| | |
|--|-----------|
| INTRODUCTION | 16 |
| THE GROWING ROLE OF DIGITAL AND PRECISION AGRICULTURE | 16 |
| THE SUSTAINABLE AGRICULTURE MOVEMENT..... | 17 |
| SKILLED WORKFORCE | 17 |
| THE OPPORTUNITY | 17 |
| NEXT STEPS | 18 |
| THANK YOU | 18 |
| APPENDIX 1..... | 19 |
| SAMPLE INTERVIEW QUESTIONS..... | 19 |
| A. Overview of Farm Operations..... | 19 |
| B. DIGITAL AGRICULTURE..... | 19 |
| C. WORKFORCE DEVELOPMENT..... | 20 |
| D. ENVIRONMENTAL SUSTAINABILITY | 20 |
| E. CLIMATE RESILIENCY | 21 |
| F. FINAL THOUGHTS | 21 |

INTRODUCTION

This document provides the reader with an overview of an initiative being led through the NB Agricultural Alliance to assess the current state of digital agriculture technology in the province. From information collected we will be preparing an overview of what we heard and potential next steps to accelerate the pace of adoption and collaboration.

The New Brunswick Agriculture Alliance (Alliance) is a coalition of people and organizations working together to advance the interests of agriculturalists within the province. The Alliance is the voice of its members and advocates on their behalf. The Alliance also offers services to the agriculture sector designed to support both its members' and the sector's ongoing productivity, sustainability and profitability.

The use of digital technologies is forecast to play an increasing role in agriculture within New Brunswick and the Atlantic region. Digital technology is globally recognized as *enabling* the achievement of agriculture productivity, sustainability and profitability through the generation of data to guide decisions. Digital agriculture represents a growing suite of applications available for use to the primary producer as well as throughout the food production value chain.

The Alliance is interested in engaging industry to identify the strategic priorities with respect to supporting the adoption of digital agriculture within the industry. As such, this document outlines how the Alliance intends to engage industry: 1) assessing the current state of digital agriculture applications in the province; 2) identifying ways to accelerate the pace of adoption; 3) the potential for regional and pan Canadian collaboration in digital agriculture; and 4) how to ensure industry has ongoing access to a skilled workforce in digital agriculture applications.

The Alliance wishes to acknowledge the support of the NB Department of Agriculture, Fisheries and Aquaculture in helping to initiate this project.

THE GROWING ROLE OF DIGITAL AND PRECISION AGRICULTURE

Digital agriculture is an emerging field that applies digital technologies and data analytics to optimize and enhance various aspects of agricultural production. It involves using satellite imagery, sensors, drones, GPS, and other digital tools to collect, process, and analyze data related to crops, soil, weather, and other factors that impact agricultural productivity.

Digital agriculture includes the application of remote sensing (sensors and other technologies to collect data) that provides data to inform decision-making and optimize various aspects of agricultural production. Applied in monitoring crop growth and health, identification of pests and diseases, and optimizing irrigation and fertilization practices. It also provides a platform for **precision agriculture**, which involves using GPS and other technologies to precisely control and monitor various inputs, such as fertilizers, herbicides, and irrigation, at the plant or zone level. This allows farmers to target specific field areas and optimize the use of these inputs, reducing costs and environmental impact.

DIGITAL AGRICULTURE

Digital agriculture impacts the entire agri-food value chain — before, during, and after on-farm production.

PRECISION AGRICULTURE

A management strategy that gathers and processes data to support management decisions for improvements to agricultural production.

Digital agriculture offers an approach to modernizing and improving the efficiency of agricultural production. It leverages advanced technologies to optimize and improve agricultural production systems. It involves collecting data through various techniques, such as sensors, drones, and GPS, and using data analytics and interpretation models to convert spatial and temporal data into practical knowledge. This knowledge can then be used as a decision-support tool to inform and enhance various aspects of agricultural production, such as irrigation, fertilization, pest control and conservation opportunities. By harnessing the power of digital technologies, farmers and farming professionals can make more informed and efficient decisions, leading to increased productivity, sustainability and profitability in the industry.

THE SUSTAINABLE AGRICULTURE MOVEMENT

The Alliance understands that our primary producer members are facing increasing pressures to reduce the environmental impact of their farming activities. While **sustainable agriculture** is often portrayed from the environmental impact perspective, the Alliance appreciates that the **sustainability of the farmer**

Sustainable agriculture is a system of farming that strives to provide the resources necessary for present human populations while conserving the planet's ability to sustain future generations.

is too often ignored in these discussions. Primary producers are being asked to reduce the environmental impacts of agriculture, including minimizing the quantity of fertilizers, pesticides and insecticides while also addressing carbon sequestration and lowering greenhouse gas (GHG) emissions. The Alliance appreciates that members have made significant strides in meeting these demands. It is also believed that digital technologies will play an increasing role in helping farmers meet the goal of sustainable agriculture by using data to more precisely guide production decisions.

SKILLED WORKFORCE

In light of the above trends and demands, it is increasingly clear the current and future agriculture workforce needs the knowledge and skill sets to successfully implement emerging digital farming technologies and practices. Western and Central Canada have already launched several initiatives related to optimizing digital agriculture designed to improve farm productivity and profitability while also meeting sustainable agriculture goals. These initiatives include both production and yields related research as well as workforce development. Olds College in Alberta <https://www.oldscollege.ca/> is one example where several programs have been designed and are underway to enhance that region's digital agriculture capacity, including ensuring the workforce has access to the required expertise. A Smart Farm initiative is also underway, involving a consortium of research and development farms conducting related research and sharing best practices across Canada. However, no Atlantic producers are currently involved in this Smart Farm initiative.

If the Atlantic region is to keep pace with its western and central Canadian colleagues, as well as producers in the United States and other parts of the world, the Alliance believes it is time to assess our sector's current capacities in the field of digital agriculture and determine what actions are required to keep apace and remain competitive.

THE OPPORTUNITY

The Alliance is interested in the views of industry and if there is a need for a *digital agriculture strategy* for New Brunswick. Based on the interviews conducted a White Paper will be prepared and will offer recommendations on the actions needed to help position New Brunswick agriculturalists for success in the digital agriculture era. The White Paper will serve as a basis for further discussions within the industry,

academia, stakeholders and government on the need and support for a ***Digital Agriculture Strategy for New Brunswick*** that identifies actions by industry to support its ability to adopt and thrive in the era of sustainable agriculture. As with any strategy, it will be a living document that evolves with the advancement in agriculture related digital technologies as well as with the growth of industry expertise and changing government policies.

NEXT STEPS

The Alliance has retained a consultant to conduct the interviews and prepare the White Paper. John Kershaw is a former Deputy Minister in the New Brunswick government. He has a wide range of experience that includes a Masters Degree in Urban and Regional Planning with a focus on agriculture in Ontario; the development of the salmon aquaculture industry in New Brunswick; regional and pan Canadian intergovernmental affairs; public education; and cybersecurity workforce development. He currently volunteers as the Chair of the Board of Directors responsible for overseeing the development of Ministers Island in Saint Andrews, New Brunswick.

The Alliance will work with the consultant to schedule the member interviews which will be undertaken in the mid February to early March timeframe. The consultant will then use the interviews as a basis for developing the Whiter Paper for consideration by New Brunswick Agriculture stakeholders.

THANK YOU

The Alliance wishes to thank you for agreeing to be interviewed in this important process. Appendix 1 is a list of sample questions the consultant will use during the interview process. However, you are free to offer any and all feedback on this important issue.

APPENDIX 1

SAMPLE INTERVIEW QUESTIONS

A. Overview of Farm Operations

1. Please provide a brief overview of your farming operations.
2. What are your greatest challenges when it comes to meeting your productivity, profitability and sustainable agriculture goals and aspirations?
3. Do you have a business plan that that has been done in the last five years?
4. Do you use Financial/Accounting Software? If so which program?

B. DIGITAL AGRICULTURE

5. How familiar are you with terms such as digital agriculture, precision agriculture, and smart farms?
6. Do you currently use digital technologies to generate data to guide your farming decisions? If yes, please provide specific examples (see chart below).

| YES | SPECIFIC DIGITAL APPLICATIONS | NO |
|--|-------------------------------|---|
| <i>Technologies currently used to track and manage crop and/or livestock inputs?</i> | | <i>If not using digital technologies:</i> 1. Are you interested in doing so? 2. What are your barriers to entry for the technology? 3. Why does this technology not interest you and/or how is it not applicable to your operation? |
| <i>Technologies used for on-board yield monitoring or to track yield spatially in real time?</i> | | |
| <i>Are you comfortable with the accuracy of the data you are collecting?</i> | | |
| <i>Do you use the data to make management decisions moving forward?</i> | | |

7. What were/are your primary motivations in adopting digital agriculture practices?
8. What are you finding to be the major challenges in utilizing digital technologies to guide your on-farm decisions?
9. What are you finding to be the major challenges in adopting digital technologies, or adopting more of them?

10. Do you have in-house expertise to conduct your current digital agriculture practices or do you out-source the required know-how (or combination)?

| IN HOUSE SERVICES | OUT SOURCE SERVICES | OUT SOURCE COMPANIES |
|-------------------|---------------------|----------------------|
| 1. | 1. | |
| 2. | 2. | |
| 3. | 3. | |
| 4. | 4. | |
| 5. | 5. | |

C. WORKFORCE DEVELOPMENT

11. What are your key workforce challenges related to implementing digital agriculture techniques?
12. Are there technologies that have been introduced to your farm operations or that you would like to introduce to your operation that will contribute to one or all of the following areas; 1) reduces costs, 2) improve yields, 3) increase profitability and 4) reduce labour requirements?
13. What are the impediments to acquiring new technology?
14. Are there technologies currently in use where improvements are required that will contribute to addressing the areas noted above?
15. How familiar are you with digital agriculture workforce development skills and training initiatives such as offerings at Olds College in Alberta (e.g., Bachelor of Digital Agriculture Degree / Pan Canadian Smart Farm consortium), UPEI course in Fundamentals of Sustainable Agriculture or the Upskills program being developed by Dalhousie University? Are there other programs that you are aware of?
16. What actions do you believe are required to produce the workforce the agriculture sector needs to support the adoption of digital agriculture applications?

D. ENVIRONMENTAL SUSTAINABILITY

17. Are you using any digital technologies specifically to assist you with monitoring or limiting the use of fertilizers, pesticides, or insecticides?
18. Are you currently using any digital technologies to help you with carbon sequestration or to limit greenhouse gas emissions?
19. Are there any specific skillsets or professional services relating to digital agriculture that you need to help advance your operation's *sustainable agriculture* goals?
20. Are your buyers increasingly demanding evidence of sustainable farming practices, including carbon reduction?
21. Do you anticipate being asked by your buyers to collect and report more production data in the near future?

22. Do you feel prepared to collect and report this data?

| | |
|---|---|
| If yes – What systems are you using and do you have the necessary employees with skillsets? | If no, how would you collect and report production data and are there any what skillsets do you require to prepare and execute a production data management strategy? |
|---|---|

E. CLIMATE RESILIENCY

- 23. Do you plan to adopt any specific digital agriculture applications in order to reduce or adapt to any climate change impacts on your farm (improve your climate change resiliency)?
- 24. Have you any specific plans or actions in mind involving digital technologies with respect to advancing the climate resiliency of your farm operations?
- 25. Are there any specific skillsets or professional services relating to digital technologies that you need to advance your operation’s climate resiliency goals?
- 26. Do you plan to use digital agriculture practices when deploying any site-specific management practices as a part of your climate resiliency plan (i.e., variable rate fertilizer, lime, seed, etc.)?

F. FINAL THOUGHTS

- 27. Do you have any ideas on support and/or assistance for farms in: 1) adopting digital agriculture practices; and 2) ensuring the agriculture workforce has the digital skills required?
- 28. Do you believe there are benefits to fostering collaboration within the Atlantic region in digital agriculture, specifically in the areas of: 1) promoting and supporting the adoption of digital agriculture practices; and 2) workforce development and training programs (similar to Western and Central Canada/Olds College)?
- 29. If this information leads to support for developing a New Brunswick Digital Agriculture Strategy who is best to lead on this?
- 30. Do you have any other thoughts or ideas relating to digital agriculture in New Brunswick, and the Atlantic region as a whole?

APPENDIX B: List of Interviewees

Dave Bell: Bell Crop Services

Glen and Tyler Coburn: Coburn Farms

David Simmonds: Presia

Ben Wholemuth: Greenleaf Custom Harvesting

Anneke Osinga: McCain Foods

Ryan Callahan: McCain Fertilizers

Zachary Hargrove: South Ridge Maple

Dodick Gasser, Josee Landry, Joey Volpe, Gordon Fairchild: CCNB Grand Falls/INNOV

Marcel Ouelette: County Lime

TJ Harvey: Florenceville

Joel Lamarche: Ferme Floray

Louise and Marcel Desilets : Ferme GAM

Daniel Paulin : Chaleur Fertilizers

Bernard Savoie : Service Agri

Donald Daigle : Pleasant Ridge Cranberry

Dr. Aitazaz Farooque: University of Prince Edward Island

Dr. Ahmad Al-Mallahi: Dalhousie University

Nathan Phinney : Canadian Cattle Association

Karon Cowan: Ag Tech GIS

Evan MacDonald: Contour Consulting

Catherine Champagne: AAFC Earth Observation Center

Xavier Herbert-Couturier: Picketa

Nick Tisdale: Yara