

# The uses of digital agriculture by producers: barriers and opportunities

Kelly Bronson, Canada Research Chair in Science & Society,  
University of Ottawa

Patricia Larkin, McLaughlin Centre for Population Health Risk  
Assessment, University of Ottawa



# Outline

- A. Overview
- B. Survey results
- C. Focus on small-scale farmers
- D. Brief word on next steps and time for Q and A

# Part A: Overview

## Digital agriculture

- ▶ Relative lack of policy or social science attention to big data and artificial intelligence compared with other sectors
- ▶ Potential benefits of digital agriculture?
  - Allows for efficient use of resources – thus maximize profitability and sustainability
  - Contribution to global food security, climate mitigation and adaptation
- ▶ Potential impacts?
  - Demands novel skills (e.g. to use data)
  - Potential shifts in farmer identify, cultural fabric of agricultural communities
- ▶ **Uneven adoption / use for Ontario farmers compared to farmers in the mid-west (AAFC surveys; Dealership surveys)**

# The research project

## ▶ Farms in Ontario and west Quebec

- On average, smaller-scale and more biodiverse than commodity farms of mid-western Canada
- Play a crucial role in food system sustainability

## ▶ Research project goal to identify and understand technology benefits / needs / concerns / and limitations of digital agriculture for producers

## ▶ Look to provide clarity for reasons of non-adoption / non-use

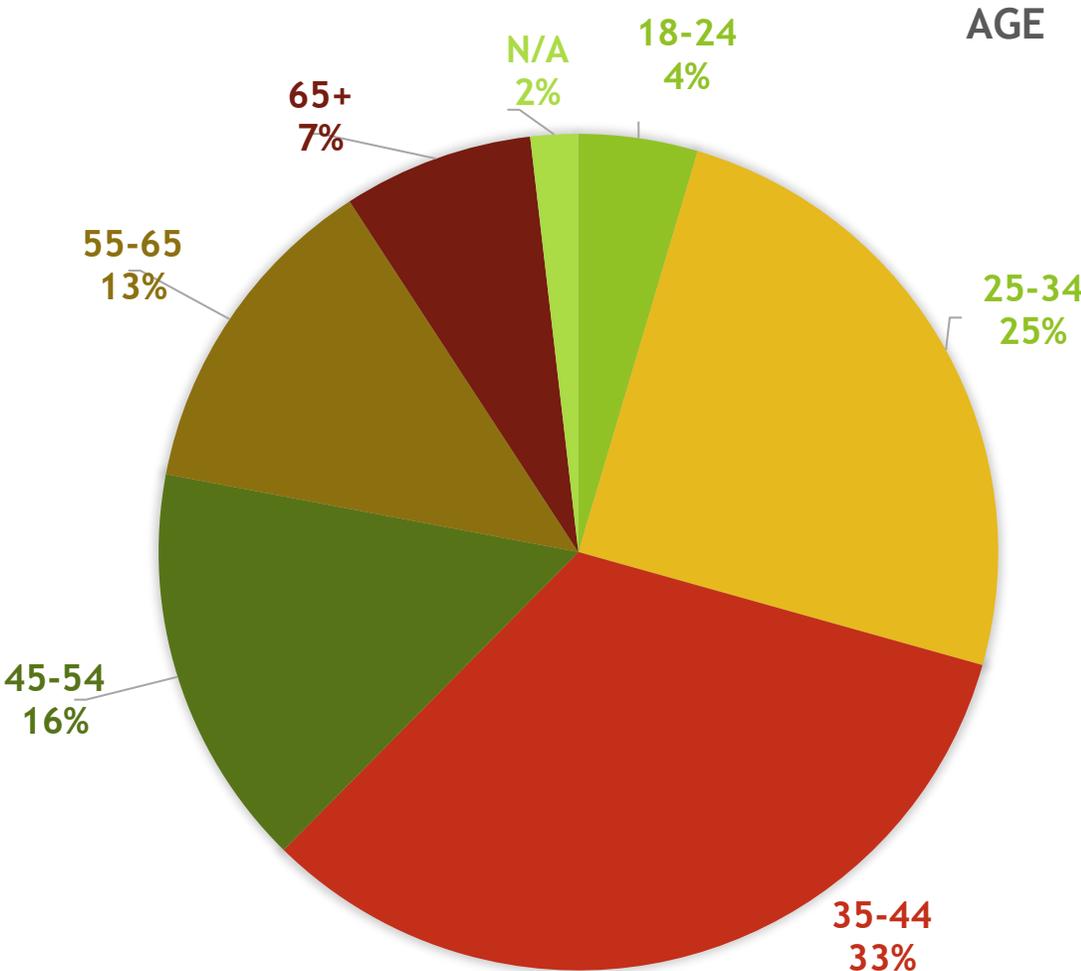
- Are there limitations in the technologies, in the policy context, or with other "levers" that affect producers in their ability to adopt digital tools?
- Are there specific technology needs which are currently unmet by industry but which could serve smaller-scale and biodiverse farms?

# Part B. Survey results

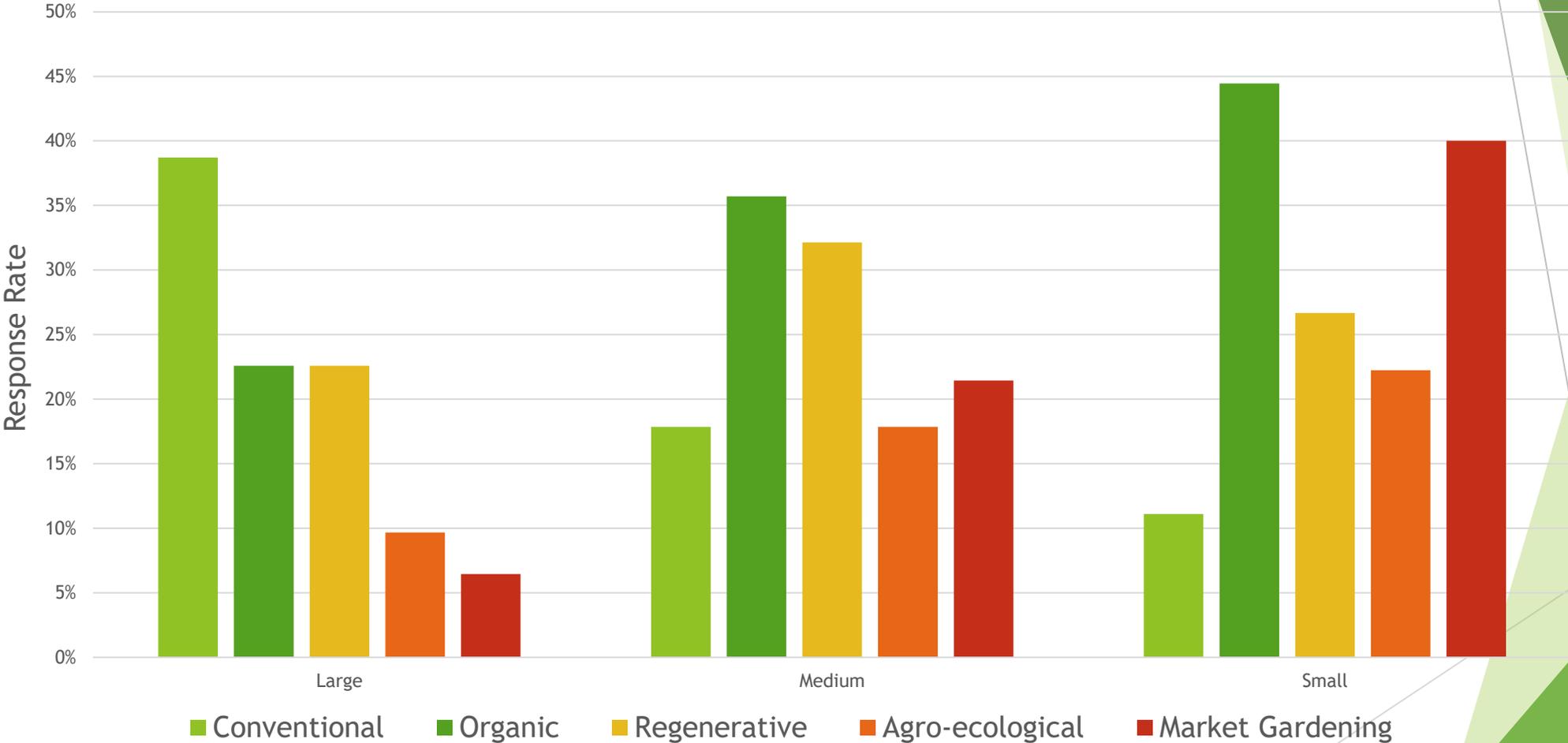
## Participant demographics

109 respondents

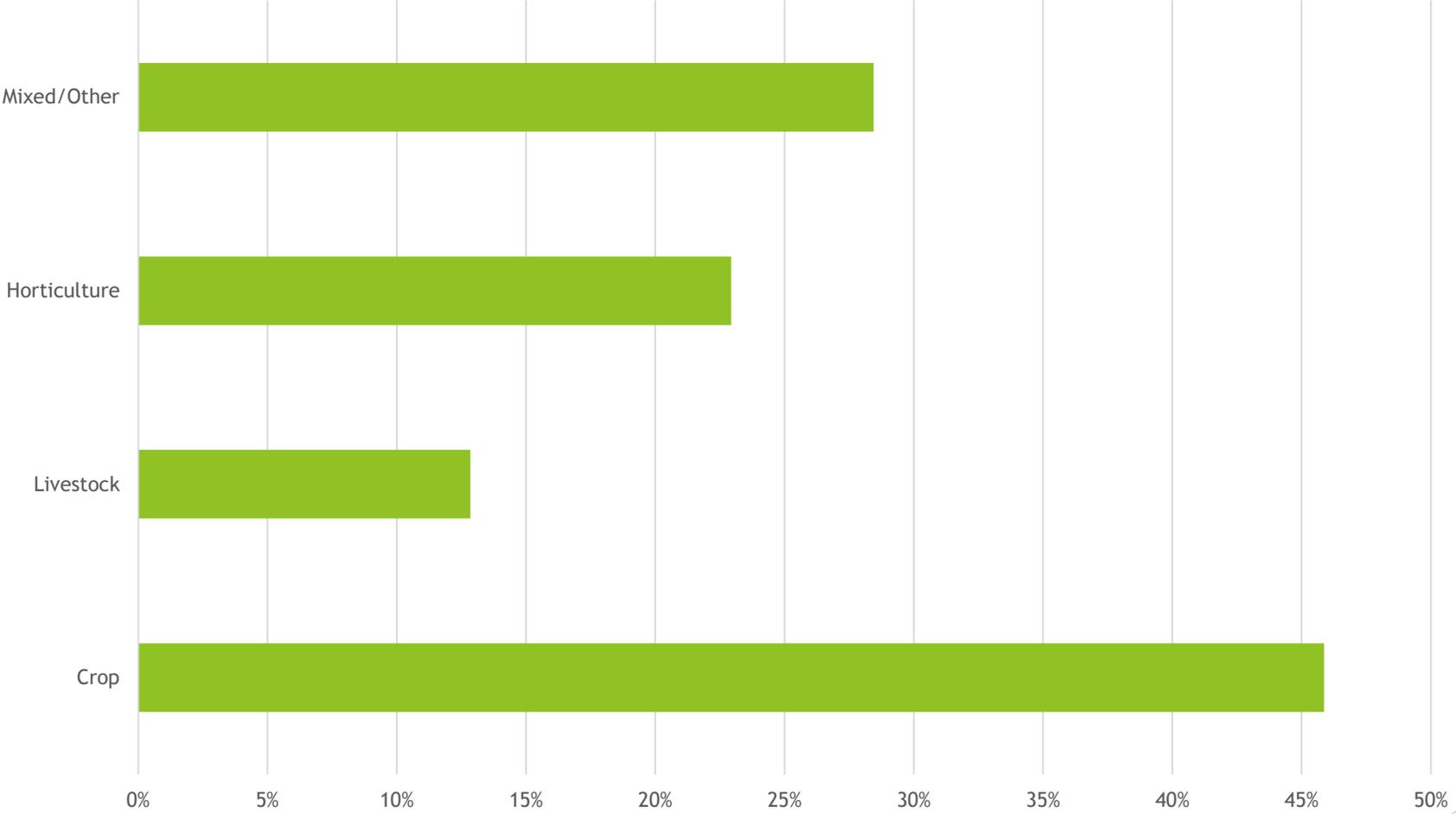
- ~39% female
- ~53% male
- ~4% prefer to self-describe
- ~3% N/A



# Respondents by farm size and farm practice



# Respondents by focus of production



# Question - In one sentence, how would you describe the term 'digital agriculture technology'?

- ▶ **Our research did not try to define the agricultural digital technologies.** Tried to keep open.
- ▶ **Farmers under the age of 54 and men were more likely to define positively**
  - *Any use of digital/computerized technology to make a farm or the work on a farm more efficient*
- ▶ **Farmers over the age of 55 were most likely to define neutrally**
  - *Farming with a computer*
- ▶ **Women were more likely to mention 'online marketing' in their definition of digital agriculture technologies.**
  - *Everything from digital communication/marketing/sales to AI used in livestock care and fieldwork*
- ▶ **No clear findings when comparing farm type or farm size with the way this question was answered**

# Question - What is the biggest advantage digital agriculture technologies could help you achieve?

## ▶ Marketing – top advantage

- ▶ Diverse farm types - conventional farmers, organic farmers, regenerative farmers
  - *More efficient customer and sales management*
  - *We are a small operation, with a niche market for our products and wish to expand to agritourism. Platforms that allow us to communicate to a widespread audience, expand our reach are the most advantageous*
- ▶ More often mentioned by large scale farmers (L: 27.3%; M: 15.4%; S: 18.2%)
  - *Connecting directly with customers to allow online sales, farm updates and product drop offs*
- ▶ Women, especially social media marketing (F: 27.3%; M: 16.7%)
  - *Selling online - so I can focus on growing*

# Question - What is the biggest advantage digital agriculture technologies could help you achieve?

## ▶ Decision-making

- ▶ Diverse farm types - conventional farmers, regenerative farmers
- *Helping to track yields, productivity and using this info to calculate seed and fertile input need*
- *Tracking animal well being and behaviour (temperature, heart rate etc.; time/location spent grazing/lounging etc.) which can help improve grazing management and animal welfare*
- *Our Orisha system controls our greenhouse and takes SO much off my shoulders, it automatically irrigates and regulates temperature of our greenhouse containing our most valuable crops. It's nice to know if I don't forget to open/close the sides, the crops will survive*

# Question - What is the biggest advantage digital agriculture technologies could help you achieve?

## ▶ Record-keeping

- ▶ Diverse farm types – conventional farms and small-scale farms
- *An advancement in managing application technology as well as monitoring and data collection for analytical purposes*
- *Record keeping for organic certification, record keeping for health records & breeding livestock*
- ▶ Women more so than men

## ▶ Efficiency / time-saving / money-saving

- ▶ Non-conventional farm types - Organic farmers\*, regenerative farmers

## ▶ No strong correlations related to age

# Part C. Focus on small-scale and alternative farmers

- ▶ **Digital agriculture has not been as useful or viable in this context**
  - ▶ ‘Lifestyle’ compared with ‘business’
  - ▶ Tasks not as repetitive
  - ▶ Concern for price and affordability
  - *There have been a lot of attempts to develop software but they usually miss the mark on usability or are cost prohibitive – with reference to ongoing licencing fees*
  - *Improved small farmer machinery - not present - could be helpful. Weed control, pest control – to identify, target weeds/pests - for small scale farmers at affordable rates*
- ▶ **Privacy in data use and governance**
  - ▶ Willingness to share data widely, especially with other farmers of their scale and type

# Relevance for public and private decision-makers

- ▶ **Digital agriculture investments that could best serve small scale farmers**
  - ▶ Tools to access markets compared with tools for production
  - ▶ Affordability
  - ▶ Overall question of additional support for innovation
  - ▶ Recognition of representation of women farmers in this scale of farm and related opportunities for innovation

# Part D: Q and A



## Thank you!

### ► Diversity by Design: emergent agricultural technologies for small-scale farming

- <https://scienceandsocietycollective.com/diversity-by-design-emergent-agricultural-technologies-for-small-scale-farming/>
- English Survey Link: <https://www.surveymonkey.ca/r/395VBDJ>
- French Survey Link: <https://www.surveymonkey.ca/r/GNHWCPB>

