Bridging Nebraska's Digital Divide

Broadband – Why Does it Matter?

NROC
Nebraska Regional Officials Council

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Precision Agriculture

Brian Cox

EXTENSION

Nobody connects with the people of NEBRASKA like the people of EXTENSION

Brian Cox

brian.cox@unl.edu

Image Credit: KLKN-TV


EXTENSION
Precision agriculture can be defined as:
“Precision Agriculture is a management strategy that gathers, processes and analyzes temporal, spatial and individual data and combines it with other information to support management decisions according to estimated variability for improved resource use efficiency, productivity, quality, profitability and sustainability of agricultural production.”
(International Society of Precision Agriculture, (ISPA) 2019).
Image Credit: AgFunderNews

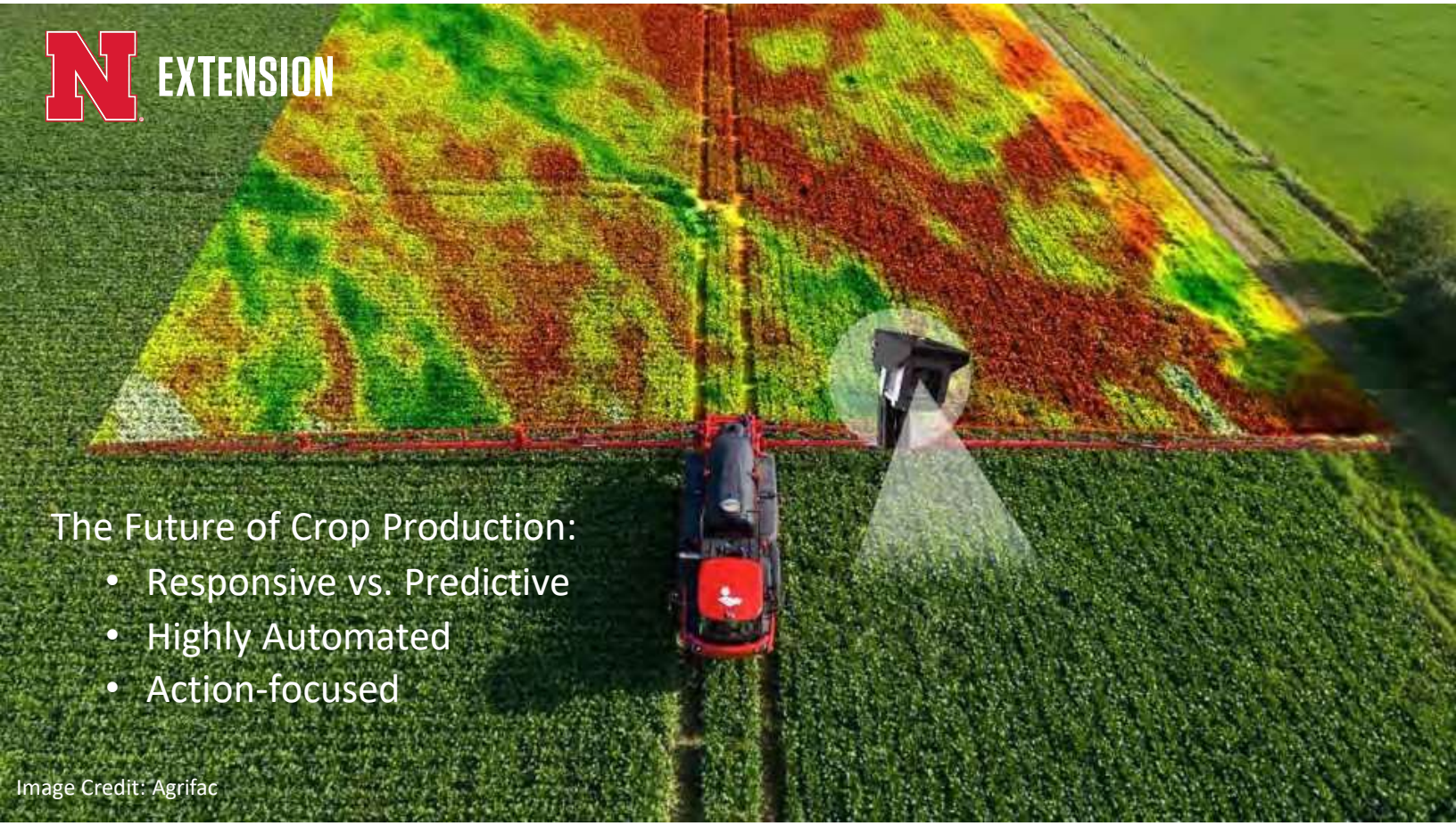

EXTENSION
Sustainability
Profitability
Image Credit: TSGC Inc.


EXTENSION
Not just crops

EXTENSION

Photo by Ashlyn Rairdin and Soumik Sarkar/Iowa State University.

Photo by NEPork.org

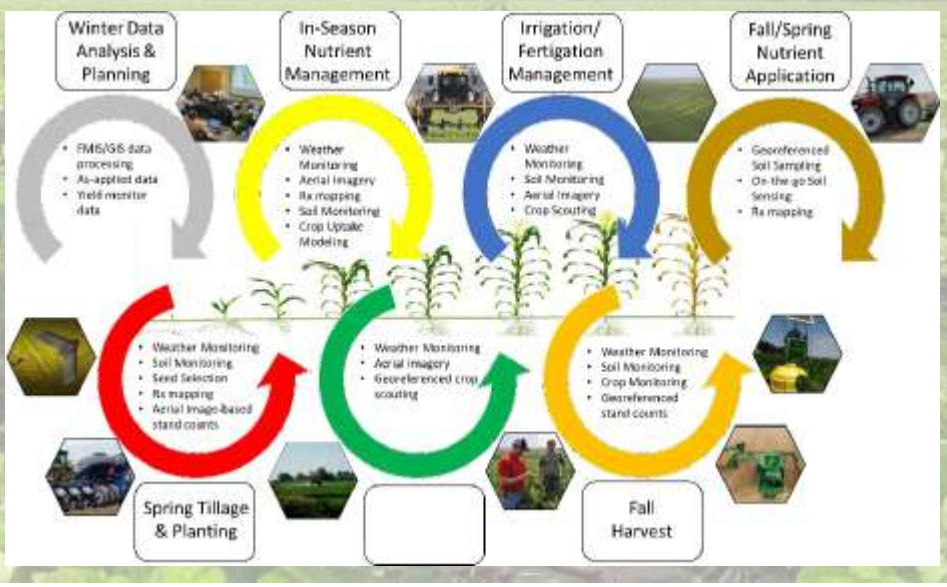

EXTENSION
The Future of Crop Production:
• Responsive vs. Predictive
• Highly Automated
• Action-focused
Image Credit: Agrifac

https://news.agcocorp.com/news/agco-launches-fuseR-connected-services

Future Technologies

What is needed to accomplish this?

- High speed data transmission
- Cloud storage and computing tools

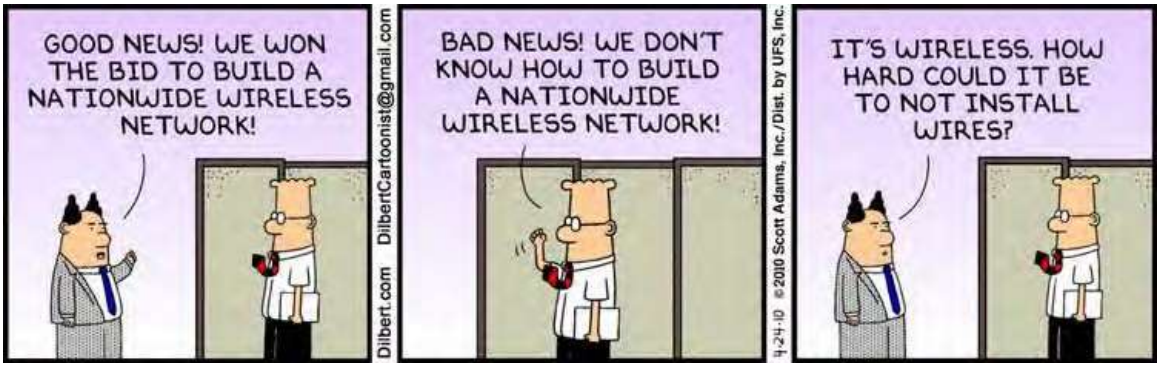


NEBRASKA EXTENSION
DIGITAL AGRICULTURE


EXTENSION
In other words,
“Broadband”

EXTENSION

NEBRASKA EXTENSION
DIGITAL AGRICULTURE



cropwatch.unl.edu/on-farm-research

precisionagriculture.unl.edu

EXTENSION

Contact Information

Brian Cox
Engagement Zone Coordinator
303.775.0813
brian.cox@unl.edu

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Precision Agriculture

Julie Bushell

paigewireless

Precision Agriculture Infrastructure

March 2022

As an agriculture state, Nebraska is looked upon globally as the leader in research, development, agricultural practices and superior agricultural products. As the Biden Administration advances its Climate Crisis Executive Order, stakeholders, investors and consumers are demanding their food, fuel, and fiber be produced in a sustainable, traceable, and humane way. It is time Nebraska tells its great story.

It is imperative we meet producers where they are today, rewarding the stewardship and sustainable practices that they have engaged in for decades, while simultaneously providing the tools and resources needed to advance Nebraska as the sustainable, traceable, and value-added agricultural leader around the world. If we do not take action now, Nebraska agriculture will be the stepping stone for other states, businesses and universities to lead the conversation and reap the economic benefits. As companies look to make substantial monetary investment into the regenerative and precision agriculture spaces, we must be prepared with the tools, capital, infrastructure, and visibility to attract it. In turn, we will proactively position ourselves to realize a revitalization of rural communities, retention of our talent, and a renewed investment into the areas of the state that are the most in need of economic and resource stimulus.

Greeley, Nebraska

Tryon, Nebraska

On-Farm Connectivity

Without proper connectivity to the farm and ranch, producers fall victim to the commodity markets. With connectivity and data, producers have the ability to prove and leverage the value of their stewardship practices, promote consumer confidence, market products more effectively and gain value insights leading to efficiencies and increased profits. "While digital technologies are already creating value within the agriculture industry today, realizing the full potential of these technologies, according to USDA, could create approximately $47–$65 billion annually in additional gross benefit for the U.S. economy. In other words, if broadband Internet infrastructure, digital technologies at scale, and on-farm capabilities were available at a level that met estimated producer demand, the U.S. could realize economic benefits equivalent to nearly 18 percent of total production, based on 2017 levels.[1]"

Expected Cash Receipt Increase for Nebraska Precision Agriculture Adoption

Beef Production

- 2019 Cash Receipts: $10.6 billion
- 2019 Cash Receipts with 18% Production Increase: $12.93 billion
- **Annual Increase (based on 2019 prices): $2.32 billion**

Corn Production

- 2019 Cash Receipts: $6.7 billion
- 2019 Cash Receipts with 18% Production Increase: $7.61 billion
- **Annual Increase (based on 2019 crop prices): $913 million**

Pork Production

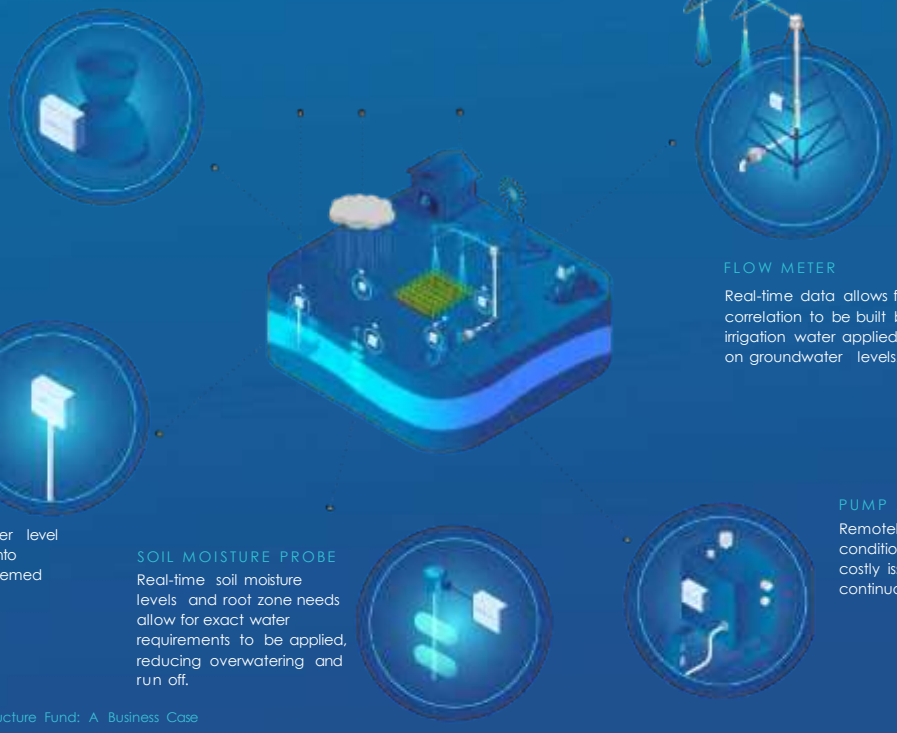
- 2019 Cash Receipts: $813 million
- 2019 Cash Receipts with 18% Production increase: $923 million
- **Annual Increase: $110.8 million**

Additional Benefits of Precision Agriculture Technology Adoption[2]

- Reduce fuel consumption by 40%,
- Reduce water consumption 20-50%,
- Reduce chemical applications up to 80%

[1] and [2] A Case for Rural Broadband, Economic Research Service, United States Department of Agriculture, at 23 and 32 (2019)

Instant insights delivered on demand



RAIN GAUGE

Tracking real-time rainfall enables smart irrigation management and reduced water usage.

FLOW METER

Real-time data allows for a correlation to be built between irrigation water applied and effects on groundwater levels.

WELL WATER MONITOR

Consistent, real-time groundwater level monitoring delivers an insight into groundwater behaviors once deemed impossible.

SOIL MOISTURE PROBE

Real-time soil moisture levels and root zone needs allow for exact water requirements to be applied, reducing overwatering and run off.

PUMP MONITOR

Remotely monitor the real-time condition of pumps while identifying costly issues before they happen and continuous- ly improving efficiency.

Traceability

Due to its topography, progressive management of natural resources, and productive acres, Nebraska has the opportunity to lead all states and nations in carbon sequestration and carbon markets. This cannot be accomplished without the adoption of IoT (Internet of Things) and broadband connectivity to farm operations and structures. Likewise, Nebraska's livestock producers stand to gain substantial returns by leveraging verified data of on-farm practices to market their products at a premium, should they choose.

The objective of data-backed and data-proven sustainability is to drive value premiums from consumers back to our producers – Nebraska's farmers and ranchers. While many studies show that sustainable practices will ultimately command up to a 40% premium in the market, the producer can oftentimes expect to realize up to a 10% premium over traditional practices.

Expected Cash Receipt Increase for Nebraska Traceable and/or Verified Goods

Beef Production

- 2019 Cash Receipts: $10.6 billion
- 2019 Cash Receipts with 9.4% Premium Applied: $11.69 billion
- **Annual Increase: $1 billion**
- Increase marketability to trade partners: water sustainability, carbon footprint, animal welfare labels

Corn Production

- 2019 Cash Receipts: $6.7 billion
- 2019 Cash Receipts with 9.5% Premium Applied: $7.35 billion
- **Annual Increase: $650 million**
- Increase marketability for ethanol producers, sustainable jet fuel: water sustainability, nitrate management, carbon footprint

Pork Production

- 2019 Cash Receipts: $813 million
- 2019 Cash Receipts with 9.4% Premium Applied: $897 million
- **Annual Increase: $84 million**
- Increase marketability to trade partners: water sustainability, carbon footprint, animal welfare labels

Additional Benefits of Precision Agriculture Technology Adoption[2]

- Reduce fuel consumption by 40%,
- Reduce water consumption 20-50%,
- Reduce chemical applications up to 80%

Union Farms

Ulysses, Nebraska

Precision Agriculture and Traceability Applied on the Farm

Union Farms in Ulysses, Nebraska is a diversified nursery- to- finish pig operation uniquely positioned to benefit from the traceability or " farm to fork" movement. Union Farms grows 2000 acres of corn and soybeans to market but also for feed, which is milled right on the farm. With the adoption of precision agriculture technologies such as soil moisture probes, energy sensors, and automation, the farm stands to gain increased yields and improve efficiencies. Precision ag technologies deliver digitized records that can be leveraged by the sixth generation producers to secure in blockchain and create an immutable record of the on farm practices that provided the premium, safe and climate smart pork chop on the consumer's plate.

Expected Cash Receipt Increase for Union Farms based on 2019 Season

Pork Production

- 2019 Cash Receipts: $778,650.00
- Cash Receipts with 9.4% Traceability Premium Applied: $859,437.09
- Annual Increase: $80,787.09

Soybean Production

- 2019 Cash Receipts: $609,363.00
- Cash Receipts with 18% Production Increase Applied: $743,126.61
- Annual Increase: $133,762.61

Corn Production

- 2019 Cash Receipts: $166,032.00
- Cash Receipts with 18% Production Increase Applied: $202,478.05
- Annual Increase: $36,446.05

Cloud- based technologies and blockchain enable producers to tell their story- leveraging produc- er-owned data for a premium

Real-time drone scouting lowers operational costs and allows for immediate action in areas hit with pests or disease

Rfid sensors provide animal health metrics and location:lowering loss and operational costs

Autonomous equipment alleviates labor shortages, increases efficiencies, quality of life

Well Monitors show ground-water levels and allow insight into water availability and planning

Soil moisture probes provide granular insights into root zone water needs. Decreasing water applied and costs

(928) 282 2783

team@paigewireless.com

www.paigewireless.com

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Telehealth

Dr. Thomas Magnuson

NROC
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Education

Mike Steele


MID-PLAINS
COMMUNITY COLLEGE

Legislated Goals

Applied Technology and Occupational Education

- Foundation education (when necessary)

2. Transfer Education

- General Academic Transfer
- Applied Technology and Occupational Education
- Foundation education (when necessary)

3. Public service

- Adult Education
- Economic and Community development
- Assessment and Job Training
- Avocational and Personal Development courses

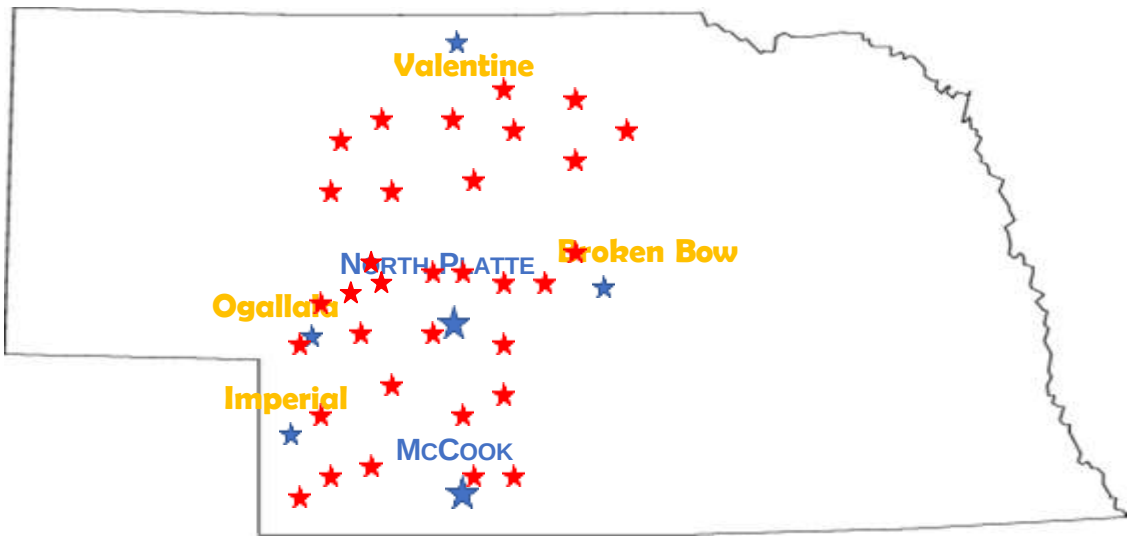
4. Applied Research

MID-PLAINS COMMUNITY COLLEGE

18 County Service Area

- 20,000 Square Miles
- 1/3 of the State of Nebraska
- 5.5% of the State's Population

30+Classrooms and Sites



Distance Education is Important

Student Access to Broadband is imperative

Distance Learning Rooms

- 19 full & 10 carts

Zoom / Teams – changing landscape

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Economic Development

Brian Adams