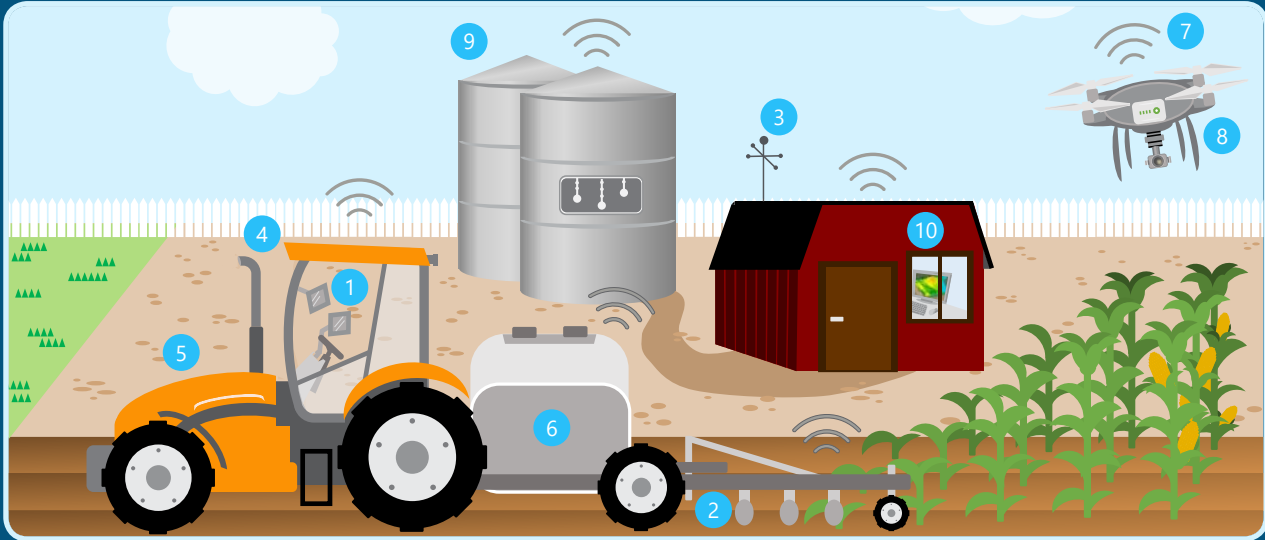


CONNECTED TECHNOLOGIES IN ROW CROPS



PLANNING

- 1 Yield Monitoring:** Combine-mounted monitors gather harvest data for business decisions, which can save \$25 per acre in input costs for corn farmers.
- 2 Precision Seeding:** Location-tagged field data can be uploaded into planning software to optimize planting decisions and placement, which can save \$6.53 per acre on seed expenses.
- 3 Microclimate Monitoring:** Satellites or on-site weather stations can forecast local weather more accurately, avoid potential pest problems, and reduce crop loss by up to 80%.

PRODUCTION

- 4 Connected Equipment Guidance:** Vehicles, including autonomous vehicles, use GPS to determine field boundaries for precise tending and save an estimated \$15 per acre on corn farms.
- 5 Remote Diagnostics and Predictive Maintenance:** Connected hardware and software diagnose—and even anticipate—needs for repair, saving \$5 to \$15 in costs per acre.
- 6 Variable Rate Application:** Technologies apply precise, optimal levels of raw inputs, saving \$22 per acre for corn farms and increasing operating profit by 1.1%.
- 7 Field Scouting:** Drone imagery and software can collect nutritional and growth data used to calculate optimal inputs, saving \$12 per acre on corn farms.
- 8 Machine Learning and Visioning:** Connected cameras and software can identify weeds, detect disease with 90% to 99% accuracy, and locate pests, facilitating treatment and reducing crop loss by 30%.

MARKET COORDINATION

- 9 Storage Monitoring:** Temperature and moisture sensors can detect storage quality for harvested products, reducing crop loss and increasing sale price by \$1 per hundredweight for grain sorghum.
- 10 Small Producer Coordination:** Web platforms connect farmers directly to buyers, allowing them to earn premiums for meeting specific quality standards and bringing between \$0.35 to \$0.51 more per bushel for corn, soy, wheat, and rice.

..... BENEFITS OF NEXT GENERATION PRECISION AGRICULTURE

ROW CROP FARMERS

After implementing precision agriculture technologies enabled by internet connectivity, row crop farmers can enjoy benefits to their **business management** and **quality of life**.

Faster learning curve
for new fields or crops

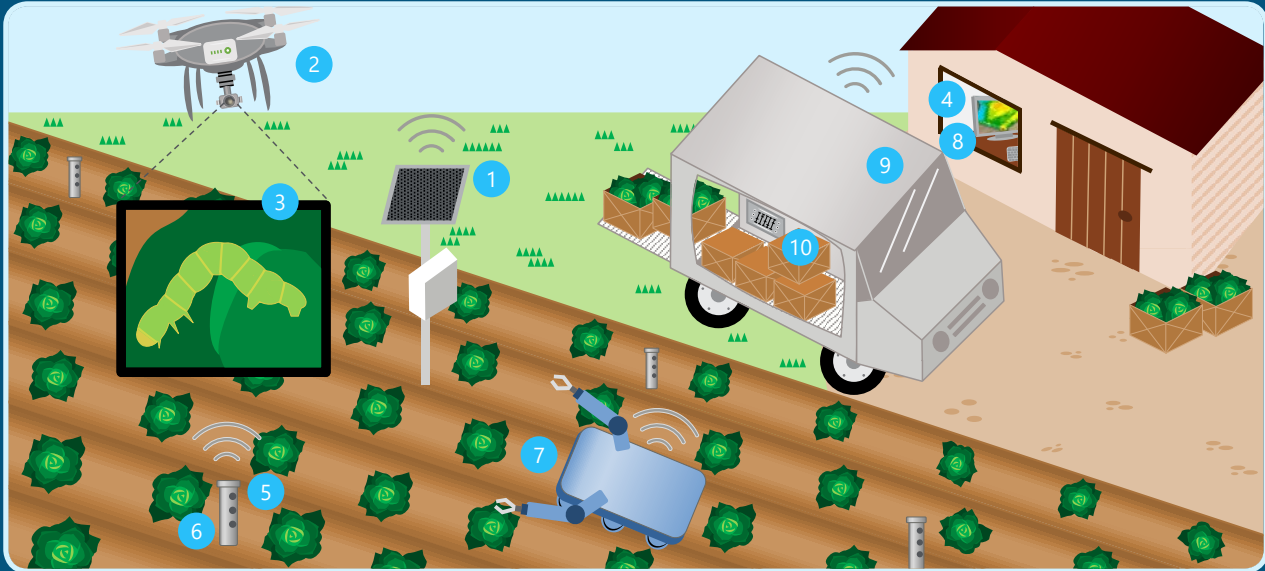
Better, real-time records
help triage problems faster and improve decision making over time

Physical health and peace of mind
through reduced hours and stress

More time
to learn new skills, research and plan, multitask, or manage

Peer learning
over digital channels

CONNECTED TECHNOLOGIES IN SPECIALTY CROPS



PLANNING

1 Weather Modeling: On-site stations can forecast and detect local problems, saving users \$19,500 per year in spray costs and preventing \$264,000 per year in crop loss.

PRODUCTION

2 Machine Learning: Software and field imagery can identify overgrown or foreign plants and inform fungicide application, reducing labor costs by 20% to 25%.

3 Pest Prevention and Monitoring: Connected drones and software can prevent or identify pest problems, reducing spray loss on the ground by 68% to 93%.

4 Input Use and Management: Decision support software can enable data-driven decision making to maximize yield while reducing inputs, like fungicide use by 50%.

5 Smart Irrigation: Soil-based plant sensors can help control irrigation systems to improve water efficiency by 20% to 25%, increase yields by 17.5%, and cause 10-20% less tip burn, increasing profitability by \$500-\$4,000 per acre.

6 Frost Detection: Wireless sensors can help identify frost patterns and alert producers, improving forecasts by 50% and increasing relative crop value by an average of 18%.

7 Robotic Harvesting: Autonomous pickers using vacuums or pincers for harvesting and picking can reduce overall harvest costs to 35% to 45% of total production costs.

MARKET COORDINATION

8 Food Waste Management: Online platforms can help sell perishable food that might otherwise go to waste, increasing market access and creating \$10,651 in additional revenue per producer.

9 Direct-to-Consumer Sales: Digital platforms can shorten the supply chain and increase producer revenue by 50% per unit of apples, 649% per unit of salad mix, and 183% per unit of blueberries.

10 Storage Monitoring: Remote sensor systems can manage containers and send alerts, to avoid temperatures and pressures causing perishable good prices to drop 10% per hour.

BENEFITS OF NEXT GENERATION PRECISION AGRICULTURE SPECIALTY CROP GROWERS

After implementing precision agriculture technologies enabled by internet connectivity, specialty crop farmers can enjoy benefits to their **business management** and **quality of life**.

Remote work
facilitating recruitment of top-tier talent

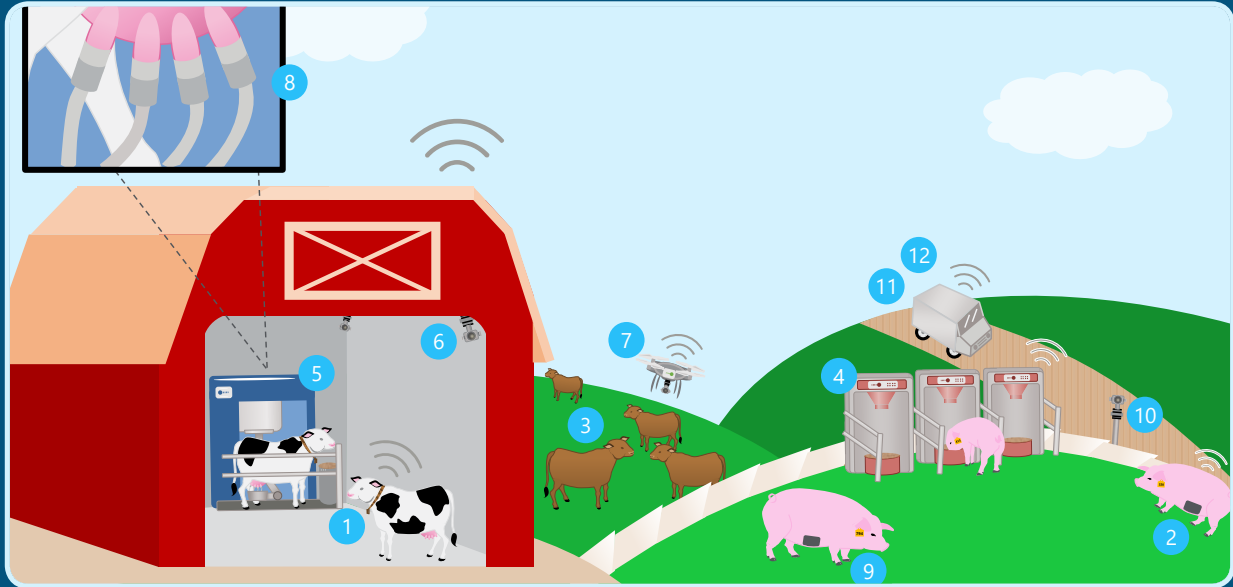
Resource sustainability
as a result of reducing raw inputs like water

Decreased reliance on labor
through automation, addressing shortages and premiums on labor

Improved food safety
and compliance with federal requirements

Experimentation
to test new tech and customize based on farm-specific needs

CONNECTED TECHNOLOGIES IN LIVESTOCK & DAIRY PRODUCTS



PLANNING

- 1 Fertility Planning:** Biosensors can track ovulation cycles and detect estrus with a 95% to 97% success rate, helping to boost pregnancy rates.
- 2 Infanticide Prevention:** Sensors can listen for sounds of distress and stimulate sows to re-position, reducing these preventable animal deaths by 75%.
- 3 Livestock Records and Management:** Software can keep records and make decisions based on real-time herd data to reduce costs by \$6 per 20kg of production.

PRODUCTION

- 4 Precision Feeding:** Sensors can calibrate and distribute optimal amounts of feed, decreasing costs by \$0.12 per day per cow.
- 5 Mastitis Detection:** Automated monitoring systems can detect early signs of mastitis and help avoid \$316 in indirect costs per infected cow per year.
- 6 Audio/Video Facility Monitoring:** Cameras and AI can help avoid or track lost animals, reducing labor time by 2.27 labor hours per 1000 pounds and two hours per broiler house per day.
- 7 Unmanned Herding:** Unmanned Aerial Vehicles can monitor and herd, reducing by 20% the cost of searching for lost cattle.
- 8 Robotic Milking:** Robots can sanitize and stimulate teats, self-attach to utters, and catch milk, increasing the frequency of milkings and increasing production by 8%.
- 9 General Health Monitoring:** Bluetooth-enabled animal wearables can monitor activity and detect anomalies, reducing medication by 15% per animal and shortening the cattle finishing process by 4 to 6 weeks.

MARKET COORDINATION

- 10 Automated Sorting:** Visual inspection, weighing, and quality sorting can optimize product pricing and return an additional \$27 per day or \$10,000 per year for a farm.
- 11 Online Channels:** Channels like online cattle auctions can return 65% more revenue per unit of beef, compared to mainstream supply chains.
- 12 Tracing and Marketing:** Technology can communicate key product attributes so consumers make informed purchases and, for farmers, unlock 15% premiums compared to retail prices of commodity beef.

..... BENEFITS OF NEXT GENERATION PRECISION AGRICULTURE

LIVESTOCK & DAIRY PRODUCERS

After implementing precision agriculture technologies enabled by internet connectivity, livestock and dairy farmers can enjoy benefits to their **business management** and **quality of life**.

- Early detection** of illness, fertility cycle, and digestive issues in animals
- Eroding advantages of scale** with diversifying business models a new selling channels
- Physical health and peace of mind** by reducing manual labor and allowing for flexible scheduling of daily activities
- Data-driven decisions** over gut instinct results in quicker, more accurate business management
- Meeting consumer demands** through direct marketing channels and transparency