



2026 UConn Extension
Vegetable and Small Fruit
Growers' Conference

Automation on NorthEast Farms



Keith Bishop
Bishop's Orchards

Introduction

The Paradigm Shift in Agriculture Automation

- **Philosophy:** Adopting "More 'brain' work and less 'paw' work." instead of "more 'paw' work and and less 'jaw' work"
- **The Shift:** Moving from "what might happen" to data-driven action on "what should we do next."
- **Reality:** Labor costs are rising; technology is the only scalable lever for efficiency.

Embracing Data-Driven Decisions in Farming



Leveraging Technology for Enhanced Efficiency

Data-driven management empowers farmers to optimize productivity.

Aerial Robotics

CT "2025 Farm Bill"

Paved the Way for Agriculture Drone Operations

Connecticut and similar states now permit drone usage in Agriculture, with regulations and permit applications forthcoming in March 2026 from DEEP.

WHO:

FAA Certified 107 Pilots coupled with a farm operator with a CT Pesticide Applicators License.

Legal Framework

To obtain an FAA Part 107 Remote Pilot Certificate in 2026, you must meet specific eligibility requirements and pass a 60-question aeronautical knowledge exam.

Approximately 20 hours of study is needed to prepare for the technical exam.



Precision Application

Enhancing Efficiency with Aerial Robotics

Impact: Enables high-precision seeding and broad application with labor efficiency.

Capacity: A single operator can now cover acreage that previously required a team or heavy tractor support.

Precision Agriculture with Aerial Robotics

**Drones enable targeted
applications for
sustainable agriculture.**

**Reduced total chemical volume through "spot treatment" rather than
blanket field spraying when integrating GPS image scouting.**



Weather Resilience

Drones can operate immediately after rain, allowing for rapid intervention to protect crops during critical growth phases.



AI Scouting

Enhancing decision-making with real-time data

Find irrigation leaks, nutrient deficiencies, blossom intensity, yield potential, weed and pest hot spots and more by using AI driven image analysis.



Drone Market Impact

----> The China Ban

The Ban: Prohibits uncrewed aircraft systems (UAS) and critical components produced in foreign countries without a security waiver.

Market Void: DJI previously held 70–90% of the ag-drone market; this supply is now restricted and unavailable to all drone users and applications.

The December 2025 Ban has reshaped the drone market, creating significant **challenges for farmers** seeking reliable supply chains and components.

Domestic Drone Costs

The rising costs of U.S. manufactured drones highlight the challenges faced by farmers in adopting advanced technologies.

- **Cost Impact: Domestic U.S. drones are 2x-4x more expensive than foreign models.**
- **Delays: U.S. manufacturers face 6-8 month delivery lead times and must pass rigorous "Blue UAS" certification audits.**





AI Vision for Grading

Enhancing precision in post-harvest processes



AI Vision for Grading

AI vision cameras enhance produce grading accuracy by detecting defects beyond human capability, ensuring optimal quality control.



Post-Harvest Strategies

Optimizing value through quality management techniques

- **Grading Logic:** Sorts produce by color, weight, and size to ensure consistency.
- **Profitability:** Precision weighing reduces "giveaway" in retail packs, while automated sorting increases throughput speed.

AI-Driven Quality Sorting

Automated systems categorize fruits into tiers, enhancing **efficiency** and maximizing **revenue** while reducing waste significantly.



Post-Harvest Strategies

Maximizing Revenue and Efficiency

They are Picked.... Now What ?



Tiered Quality Management

AI-Driven Sorting

Advanced AI systems can effectively categorize produce into "categories," optimizing sales strategies and minimizing waste.

Waste Reduction

Quickly selling lower-grade products prevents spoilage, ensuring that less produce goes to waste and optimizing overall profitability.

Tiered Quality Management

Premium Pricing Strategy

Selling top-quality fruit at farm stands allows growers to capture maximum value, enhancing their revenue potential significantly.

Technology Improvements

Implementing smart technologies enhances revenue capture by providing real-time market data, allowing growers to make informed pricing decisions.

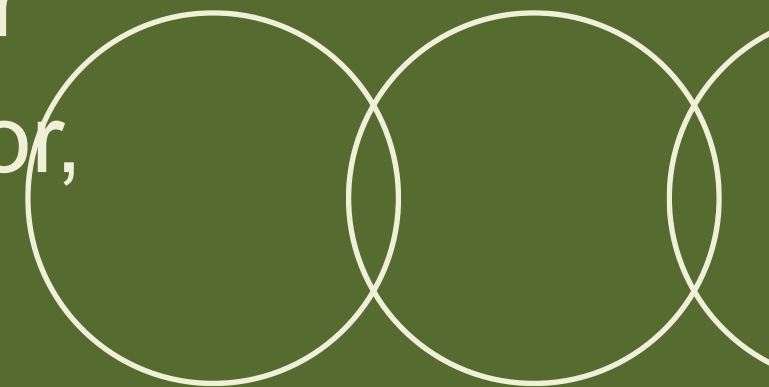
Labor Management Strategies

Optimizing productivity, compliance and safety

Adoption Statistics

Approximately **70% of tech-forward farms** have embraced smart labor tracking systems, showcasing a significant industry trend toward technological integration.

Integrated software such as **CropTracker** has **Time Clock** features for individual employee digital punches, or Crew punches by a supervisor, and reports for H2A compliance.



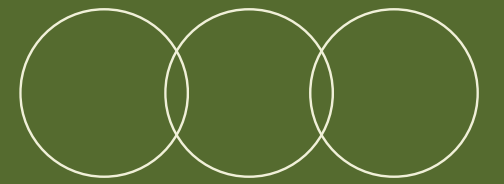
GPS-Driven Equipment

Enhancing Farming Autonomy



Autonomous GPS Solutions

Enhancing Efficiency in Farming



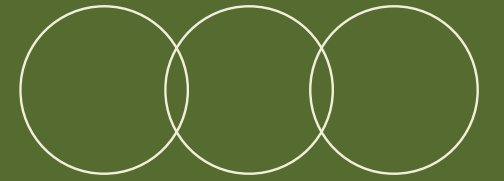
Labor Shortages

Autonomous GPS-guided tractors and robots are revolutionizing the agricultural landscape by addressing critical **labor shortages**. As farms struggle to find qualified staff, these machines allow for uninterrupted operations, ensuring timely operations while reducing dependency on human labor.

Enhancing Efficiency in Farming

Autonomous GPS Solutions

Enhancing Efficiency in Farming

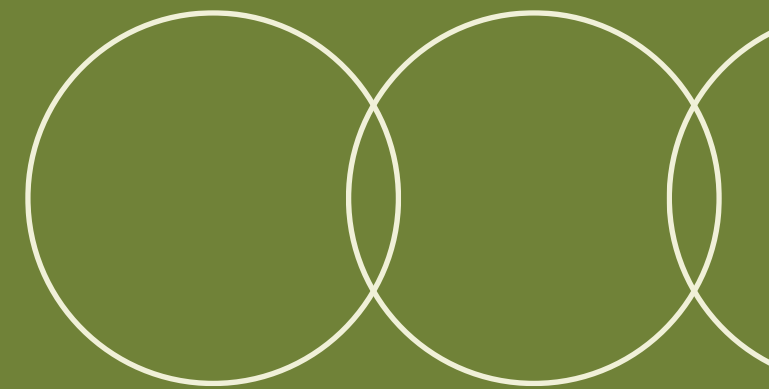


Precision Benefits

GPS technology enhances **precision agriculture** by significantly reducing waste through accurate resource management. With precision-guided systems, farmers can optimize seed and chemical application, leading to better crop yields. Additionally, automated logging simplifies compliance with regulations, ensuring a seamless production process and effective traceability.

EV Tractors Overview

Exploring advantages and challenges



Benefits and Challenges



Evaluating Electric Tractors

Ideal Environments

Electric tractors are particularly **beneficial** for precision work on uniform spaced crops and minimal slopes. Their zero emissions significantly enhance **worker safety** and improve crop conditions by reducing harmful air pollutants, creating a healthier environment for both employees and crops.

Drawbacks

- However, electric tractors face challenges such as limited runtime.
- Cold Northeast temps reduce range and slow down charging.
- Heavy batteries increase soil compaction risks.
- Lack of rural charging networks necessitates expensive farm upgrades

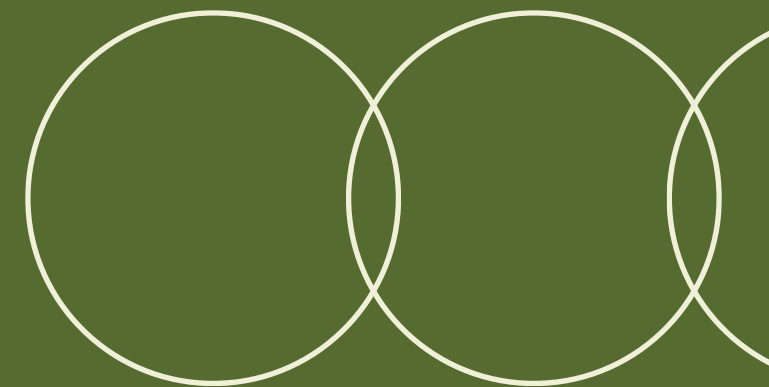
Investment Tax Credits

Navigating financial opportunities

Connecticut Incentives, part of the CT 2025 Farm Bill

Connecticut provides a **20% refundable credit** on new eligible, 5 year life or more eligible ag machinery, including electric tractors and robots, available from January 1, 2026.

de a Farm Transition Grant prioritizing climate-smart investments in 2026.



Solar Energy Incentives



Maximizing financial support options

Federal Tax Credit

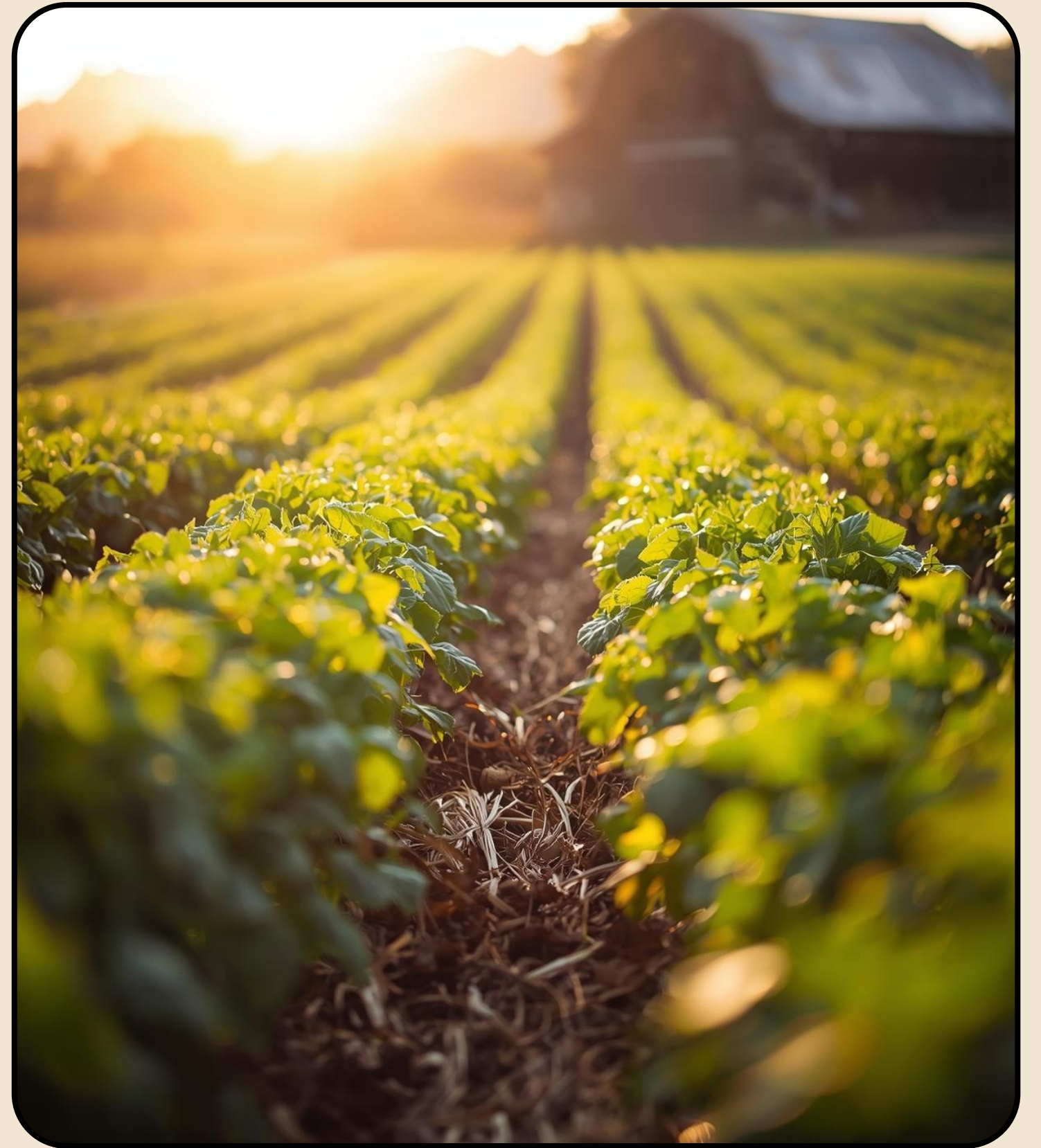
The **Federal Investment Tax Credit (ITC)** offers a 30% rebate for solar projects started by July 4, 2026, with an operational deadline of December 31, 2027.

USDA Programs

The **USDA REAP grants/loans** can cover up to 50% of renewable energy project costs, supporting the transition from diesel to electric tractors and enhancing overall farm sustainability efforts.

Advanced Farm Business Automation

Presented by Keith Bishop



Checkout Systems

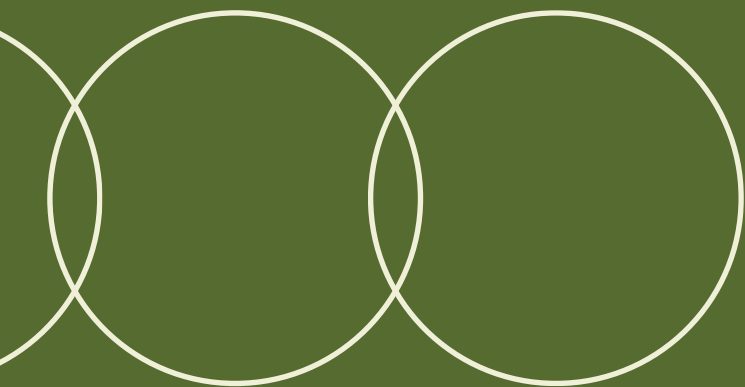
Leveraging technology to enhance sales accuracy and efficiency

Business Intelligence Hubs

Modern systems have shifted from cash boxes to **intelligent checkout solutions**, providing insights and improving overall operational efficiency.

Shrinkage Reduction

Advanced systems deter **theft and errors**, significantly reducing shrinkage through automated monitoring and enhanced security measures.



Checkout Systems

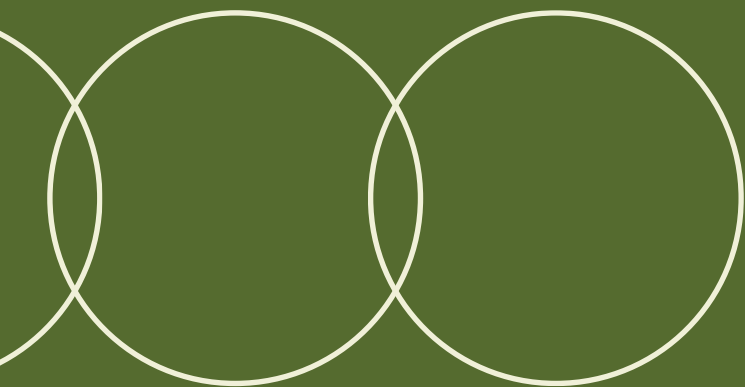
Leveraging technology to enhance sales accuracy and efficiency

Automated Age Verification

Implementing automated verification allows for **faster transactions** while ensuring compliance with age restrictions, such as age banded admissions and alcohol sales, enhancing customer experience and operational speed.

Offline Mode Capability

The ability to operate in offline mode is critical for remote fields with poor connectivity, ensuring that transactions can continue seamlessly and data is synchronized once the connection is restored.



Seasonal Volume Management



Tools for Farm Efficiency

Pay-as-you-go Software

Implementing pay-as-you-go software fees aligns costs with seasonal business cycles, ensuring that farms only pay for what they use, which enhances financial flexibility and resource allocation.

Satellite Units

Utilizing handheld units allows staff smartphones to function as extra registers during peak seasons, significantly improving transaction capacity without the need for additional hardware investments or setup time.



Automating Farm Management Strategies

Effective farm operations require integrating marketing, accounting, and event management for enhanced profitability and growth.

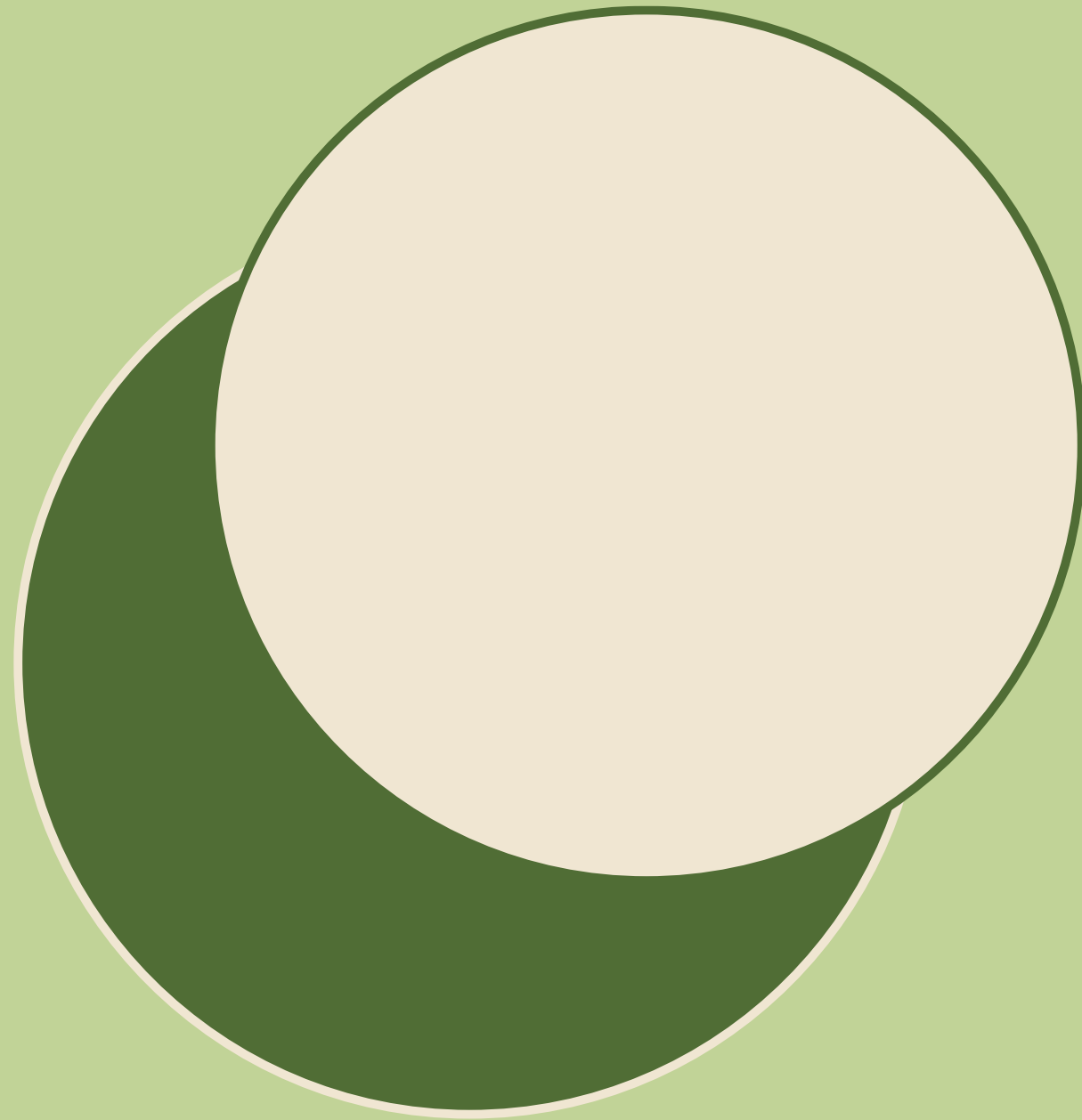
Evolving Landscape

The farm business landscape is continuously changing, driven by **technological advancements** and shifting consumer demands. Modern agricultural operations face increased complexity, necessitating a multifaceted approach to management. Integrating marketing, accounting, and event management is crucial to enhance **profitability** and optimize resources. By embracing a holistic strategy, farmers can navigate the evolving challenges while capitalizing on new opportunities, ultimately driving sustainable growth and enhancing their competitive edge in the marketplace.



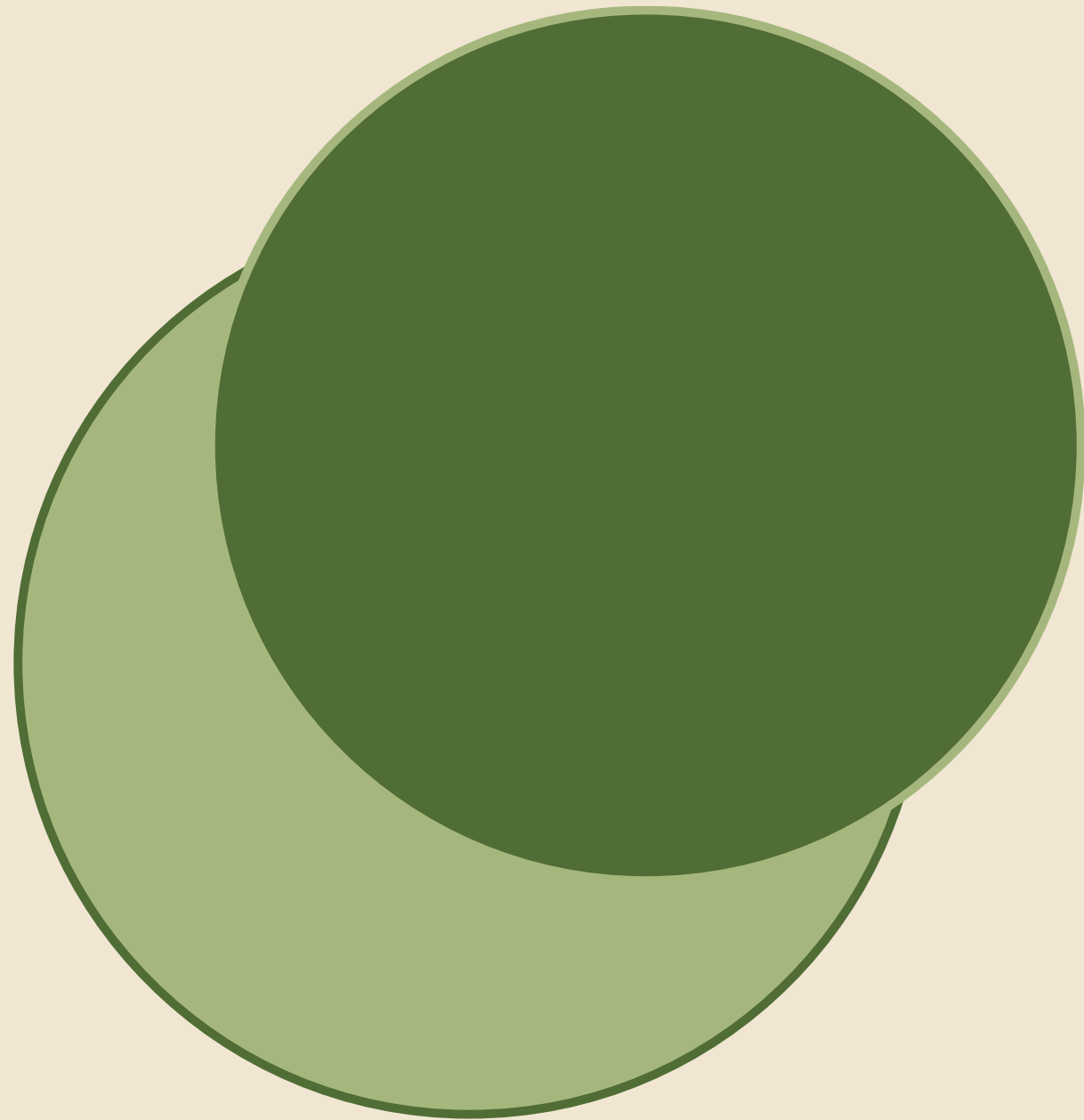
Objectives of Integrating Key Operations for Success

To enhance profitability, we must focus on **integrating marketing, accounting, and event management** within farm operations.



Marketing Integration: Enhancing Customer Connections Through Data

Leveraging data analytics helps farms understand customer preferences, enabling targeted marketing strategies that drive engagement and sales.



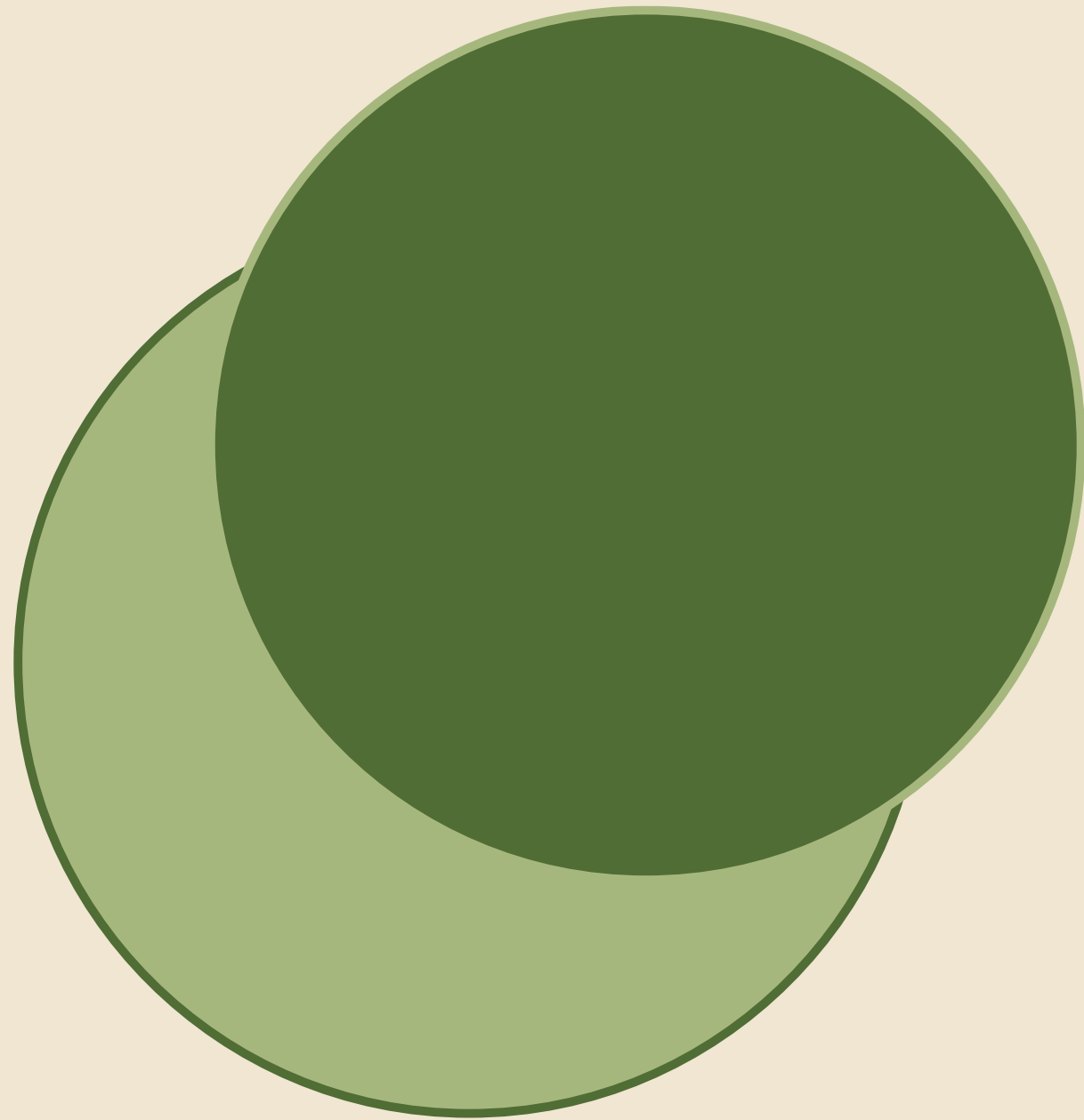
Enhancing Customer Engagement through Data Integration

Integrating POS data with social media allows farms to create targeted marketing campaigns, boosting engagement and sales significantly.

Timely Alerts

Implementing automated alerts for weather and harvest updates can significantly enhance customer engagement. By providing timely information, farms can drive traffic and improve customer experience. For instance, notifying customers about optimal harvest days or weather conditions can encourage them to visit the farm or purchase products.

Leveraging technology to send these alerts through various channels ensures that customers receive relevant information, fostering loyalty and connection in a competitive market.



Retention Strategies: Enhancing Customer Loyalty and Engagement

**Implementing rewards programs
can significantly boost customer
retention, encouraging repeat
purchases and fostering lasting
relationships.**



Streamlining Financial Management in Farm Operations

Effective back office and accounting practices are essential for **enhancing efficiency** and **profitability** in farm businesses.

Granular Sales Reporting

Implementing granular sales data reporting is crucial for understanding the financial health of a farm business.

By separating produce sales from admissions revenue, farmers can gain clear insights into their performance. This level of detail allows for better operational decision-making, enabling targeted marketing strategies and identifying profitable product lines.

Investing in reporting tools not only enhances transparency but also supports strategic planning, ensuring that resources are allocated efficiently for sustainable growth.

Seamless Bookkeeping

Implementing direct CSV export capabilities allows farm businesses to integrate their sales data effortlessly with accounting software like QuickBooks.

This automation streamlines bookkeeping processes, reducing manual data entry errors and saving valuable time.

By generating accurate financial reports with just a few clicks, farmers can maintain clear oversight of their finances. This integration not only enhances operational efficiency but also provides essential insights for informed decision-making and improved profitability in a competitive landscape.

Automating Compliance

Automating sales tax reporting is essential for modern farm businesses. By utilizing software tools, farms can reduce errors and save time on compliance tasks.

Automation allows for real-time updates on tax rates and simplifies the categorization of income, ensuring that all sales are accurately reported.

This proactive approach not only minimizes the risk of audits but also provides peace of mind, allowing farm operators to focus on growth and profitability without the burden of manual tracking.



Event Ticketing: Enhancing Farm Business Diversification

Integrating event ticketing allows farms to attract visitors, **boost profitability**, and create memorable experiences through diverse offerings.

Digital Ticketing

Integrating **digital tickets** into farm operations enhances the customer experience while streamlining entry management. Utilizing QR codes allows for quick scanning and easy access to events, reducing wait times and improving satisfaction.

Additionally, integrating with Apple Wallet provides a convenient platform for customers to store their tickets securely. This modern approach not only simplifies the ticketing process but also promotes a more efficient management system for farm-based attractions and experiences.

Being a member of the **CT Farm Bureau and commodity groups** can significantly enhance your farm business operations.

These organizations provide invaluable legislative work to protect and support farms, networking opportunities, fostering connections among farmers, industry professionals, and agricultural experts.

By participating in events, workshops, and discussions, you can gain insights into best practices, access resources, and collaborate on innovative solutions. Building relationships within these networks not only strengthens your business foundation but also promotes a sense of community and shared knowledge in the agricultural sector.

Automation is a tool; strategic management drives SUCCESS

Effective strategies ensure growth and sustainability

Staying current with ag-tech trends fosters innovation and strategic growth, enhancing farm operations and community engagement.



Questions ?

EMAIL

keith.bishop@bishopsorchards.com

PHONE

203-627-6589

SOCIAL MEDIA

[@farmerkeithbee](#)

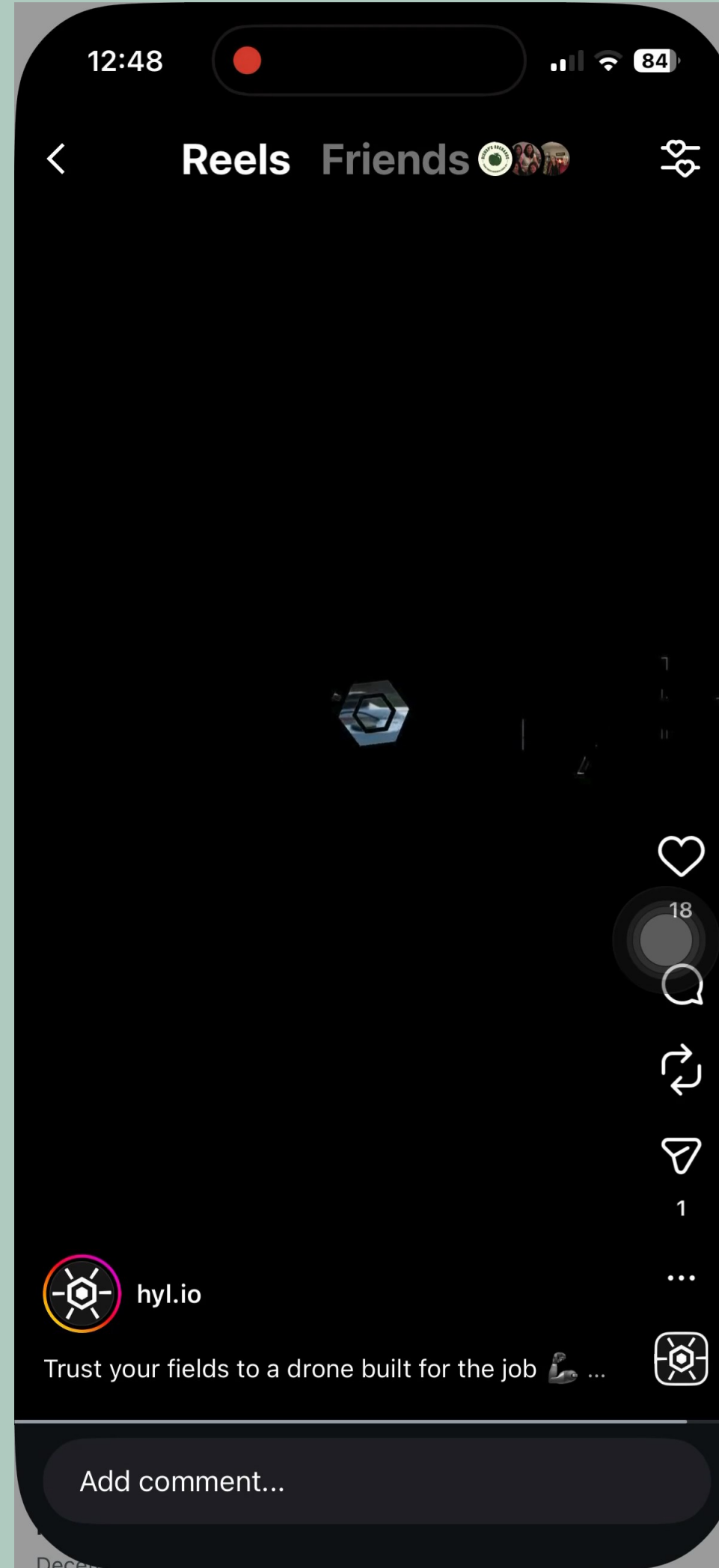
Umass Cranberry Station Test Flight



The Future Awaits

Embrace innovation in agriculture

HYL.IO Instagram Post



The Future Awaits

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