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Hawai‘i Farm Technology Update with Potential to Boost Economic Development, 2025

A recent USDA-NASS survey in cooperation with the Hawai‘i Department of Agriculture and Biosecurity offers a snapshot of how farmers and ranchers across the islands are using, or intending to use, modern technologies. Considering there are 6,569 farms in Hawai‘i (Agricultural Census 2022), some of the measures show a remarkable high level of technology adoption on local farms. A summary of key findings are as follow:

1. **High Adoption of Cell-based Tools**
   - 5,709 Hawai‘i farm operations (87% of total) already use smartphones and an additional 656 reporting they want them.
   - 2,332 farms (36% of total) use tablets (e.g,. *iPads, Android*) and 806 (12% of total) more want them.

2. **Interest in Drones and Unmanned Aircraft System**
   - 173 farms already use drones (for scouting, seed dispersal, fertilization, or protection). Another 751 more express interest.
   - For security purposes, 123 farms currently use drones and an additional 429 like to adopt them.
   - Drone use for bird/predator control or fencing/irrigation inspections is also growing.

3. **Anti-theft and Security Technology**
   - Video surveillance cameras are widespread with 4,791 farms (73% of total) using them and 4,490 (68% of total) wanting to use them.
   - Motion sensor lights are popular and 5,006 farms (76% of total) currently uses them.
   - GPS anti-theft trackers for vehicles and equipment have 530 adopters and another 2,433 more want them.
   - GPS livestock tracking devices show strong demand with 4,591 being used and another 10,086 wanted.

4. **Sensors & Monitoring**
   - Handheld sensors (e.g., moisture meters, plant health) are used by 548 farms with 1,343 more wanting them.
   - Field sensors for moisture and soil conditions has 899 users and 1,669 wanting them.

5. **GPS-Guided and Autonomous Equipment**
   - 133 farms currently use GPS-guided equipment (tractors, etc.) and another 220 wanting them.
   - 301 farms already have autonomous tractors, harvesters, or planters with 518 more report wanting them.

6. **Software and Management Services**
   - 1,234 farms (19% of total) use budgeting software or farm operation management while another 526 want them.
   - Smartphone apps for field data (weather, yield, condition) are used by 1,333 farms and 575 additional farms express interest.
   - Third-party service or applications (fee for service) have 357 current users and 137 prospective adopters.

7. **Other Technologies**
   - Radio Frequency Identification (RFID) livestock identification tags are popular with 26,580 currently in use and another 24,942 being requested.
   - In bird and predator control, stationary deterrents (sound systems), advanced robotics and laser deterrents are in demand.

In summary, many Hawai‘i farms already use foundational digital tools (smartphones, cameras, sensors), and there is robust demand for more advanced technologies such as drones, autonomous equipment, livestock tracking, precision sensors, budgeting and farm-management software.

Beyond the available information, Hawai‘i farmers and ranchers can use these technologies to boost economic development. Some of the ideas and pathways to translate technology adoption into stronger economic resilience, higher productivity, and new revenue streams includes the following:

1. **Optimize Input Use and Reduce Waste via Precision Agriculture**
   - Use soil and moisture sensors plus weather and plant health sensors to tailor irrigation, fertilization, and pesticide application. This can improve yields and reduce costs (water, fertilizer).
   - Pair sensors with drones to survey fields and map stress zones for targeted interventions.
   - Over time, data-driven decisions can improve consistency of harvests and open up benchmarking or premium product positioning (e.g., sensor-optimized produce).

2. **Enhance livestock management & reduce losses**
   - Use RFID tags (already widely used in Hawai‘i) plus GPS collar devices to monitor animal movements, health, grazing patterns, and detect anomalies (e.g., illness, straying).
   - Drones can monitor pasture health or detect fence issues quickly across rugged terrain.
   - Autonomous feeders or waterers can help in remote or rugged areas, improving efficiency and labor savings.

3. **Strengthen Security and Reduce Theft and Loss**
   - Combine video surveillance, motion sensors, GPS tracking, and drone monitoring to protect equipment, vehicles, and livestock.
   - Predictive analytics or anomaly alerts (e.g., if a vehicle moves outside expected boundaries) can trigger real-time alerts.
   - This not only reduces losses but can reduce insurance premiums or boost investor confidence.

4. **Support Value-added and Agritourism Ventures**
   - Use appliances and software to manage booking, visitor tracking, farm tours, farm stays, or on-farm sales.
   - Drones and video cameras can create marketing media (aerial videos to attract visitors).
   - Precision agriculture can help produce specialty crops (microgreens, specialty fruits, high-value niche crops) more reliably, supporting small-batch processing or direct-to-consumer sales.

5. **Collaborative or Shared Services Models**
   - Farms might pool resources to acquire expensive machinery (e.g., autonomous tractors, drone fleets) or share access to data platforms.
   - Cooperative digital services (e.g., shared software, pest/disease forecasting tools) can lower per-farm cost.
   - Local technology hubs or "agri-tech extension centers" could serve multiple farms, assisting with setup, maintenance, and training.

6. **Integrate Data for Long-term Planning, Grant Access, and Traceability**
   - Maintaining good digital records helps with grant applications, compliance, certification (organic, sustainability), and traceability (critical in markets).
   - Over time, datasets built on sensor, yield, financial, and climate metrics become assets for strategic decisions, benchmarking, and risk management.

7. **New Service Offerings and Contracting**
   - Some farms might offer drone scouting or soil sensor installation/management as a service to neighbors or smaller farms.
   - Aggregated farm data (anonymized) could be used to partner with private sector or research institutes for climate modeling, breeding trials, or sustainability certifications.

By integrating these technologies thoughtfully, Hawai‘i farmers and ranchers can strengthen productivity, reduce losses, improve quality and consistency, access premium markets, and build resilience — all contributing to economic development of both farm operations and surrounding communities.

Reference:

USDA-NASS, September 30, 2025. Farm Technology in Demand on Hawaii Farms. Available at: Hawaii Farm Tech2025_Final.pdf (Accessed October 6, 2025).

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