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Use of the Farm Health Guardian technology to improve system biosecurity

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Introduction

Movement of people and vehicles between swine facilities remains one of the most significant risk factors for introducing and disseminating infectious diseases within integrated pork production systems. A Swine Health Information Center (SHIC) funded study found that the frequency of site events (eg, deliveries, service calls, transportation movements) was strongly correlated with testing positive for key swine pathogens including porcine reproductive and respiratory syndrome virus (PRRSV), porcine epidemic diarrhea virus (PEDV), and porcine deltacoronavirus (PDCoV).[1]

Given the link between routine site movements and pathogen introduction, effective biosecurity requires timely detection of high-risk events. Traditional biosecurity programs rely heavily on employee compliance, manual documentation, and evaluations that are typically conducted only after a disease break. Digital traceability platforms, such as the Farm Health Guardian biosecurity management software, enable real-time monitoring of movements and automated identification of non-compliant events, improving the ability to prevent and respond to disease spread.

Pillen Family Farms, a third-generation, family-owned and operated swine production system based in Nebraska, implemented Farm Health Guardian throughout its entire production system following a 2024 pilot project. The primary goal was to enhance visibility of animal, vehicle, and personnel movements and to reduce biosecurity risk between farm properties.

Methods

Farm Health Guardian was implemented across 215 Pillen properties, 471 vehicles, and 290 registered app users. Vehicles were connected to the system either through integrated GPS data links or through installation of GPS devices to record visits to geo-fenced properties. Trailers were equipped with GPS taillight modules, while tractors and miscellaneous farm equipment were fitted with solar-powered GPS units. Vehicle types include feed trucks, market livestock trucks, nursery livestock trucks, sale livestock trucks, feed trailers, livestock trailers, company vehicles, and agronomy equipment.

All production sites, including nucleus farms, gene centers, gilt developers, farrow-to-wean farms, nurseries, finishers, truck washes, and feed mills, were geofenced within the platform.

Each swine facility was assigned one of 18 health-status levels, with lower numbers representing higher-health sites. Health statuses were fully adjustable within the system, enabling real-time updates whenever disease was detected or health events were confirmed. Movement policies were constructed within the software to define required downtime intervals between sites of different health levels for both personnel and vehicles. Additional policies were developed for transport-specific activities, such as required truck washes, downtime or both before moving from low-health to high-health sites.

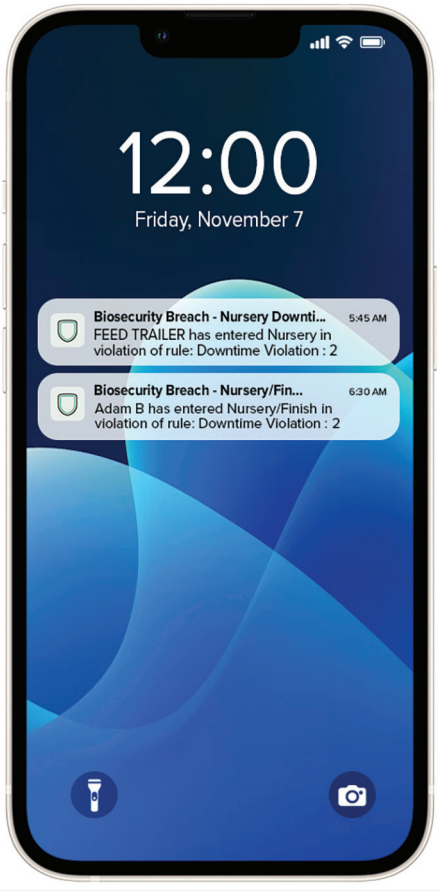
Results

From October 2024 to October 2025, a total of 347,856 property visits were recorded. Vehicle movements accounted for 276,509 visits (79.5%), while user movements accounted for 71,347 visits (20.5%).

Real-time breach alerts were automatically generated whenever established movement policies were violated. Designated biosecurity team members received immediate notifications, allowing for rapid follow-up and resolution of non-compliant events (Figure 1). Individual users also received automated alerts when they breached established downtime policies, increasing awareness and accountability.

Analysis of movement and breach data identified several areas of opportunity for improving system-wide biosecurity protocols. System insights led to updates in transport biosecurity procedures for both feed and livestock movement. For example, dedicated feed trucks were assigned to specific high-health and

Figure 1: Example of a breach notification alert sent through the Farm Health Guardian software when a user or vehicle attempts to visit a site without meeting the required downtime.



low-health site groups, and a new policy requiring either downtime or a truck wash before transitioning from low-health to high-health sites was implemented. Trucks failing to meet these requirements triggered real-time breach notifications.

For personnel, the visibility provided by digital tracking contributed to a decrease in multi-site visits per day, reducing cross-site contamination risk.

Discussion

Implementation of the Farm Health Guardian digital biosecurity platform across the Pillen Family Farms system enabled comprehensive monitoring of personnel and vehicle movements, real-time detection of biosecurity breaches, and improved compliance with established biosecurity policies. Real-time alerts allowed non-compliant events to be addressed promptly, reducing the risk of disease transmission. Given that PRRSV is estimated to cost the US pork industry approximately $1.2 billion annually,[2] timely detection and intervention of high-risk events may help reduce economic losses. The system facilitated data-driven decision-making and refinement of transport and site-access protocols, demonstrating that the integration of digital traceability tools can enhance biosecurity and reduce disease transmission risk within large swine production systems.

References

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2. Osemeke, OH, et al., Updates on the economic impact of PRRSV to US pork producers. In: *Proceedings of the 2024 Allen D. Leman Swine Conference*. University of Minnesota; 2024:174.