

Disease Outbreak Challenges

- PRRSV and PEDV remain persistent threats to U.S. swine herds, with outbreaks occurring year-round; April 2025 saw the highest PRRSV positivity since 2018, especially in grow-finish sites.
- Increased site activity has been shown to elevate outbreak risk, underscoring the importance of monitoring farm operations and movement.
- Excluding human movement from biosecurity assessments underestimates outbreak risk, highlighting the role of indirect transmission via vehicles, personnel, and fomites.

The objective of this study was to evaluate the effectiveness of GPS-based technology in enhancing visibility and improving compliance with transportation-related biosecurity protocols.

Materials & Methods

- **Study design:** Observational study conducted in the wean-to-finish segment of an integrated swine production system.
- **Technology integration:** Farm Health Guardian (FHG) platform linked with the company's GPS tracking system to monitor real-time movement of feed trucks and fleet vehicles (e.g., service and maintenance trucks).
- **Geofencing & health status:** Geofences placed around production sites to log vehicle entries/exits; site health statuses updated weekly and synced to FHG to apply movement restrictions. Sites with multiple health statuses during the study were excluded.
- **Study periods:** Period 1 (7 weeks): Baseline monitoring to refine geofences and biosecurity criteria. Period 2 (8 weeks): Active monitoring of vehicle events, biosecurity alerts, and alignment with operational expectations.
- **Data collection:** Vehicle activity before/after FHG implementation, downtime compliance, adherence to biosecurity pyramid protocols by vehicle type, and categorization of breach alerts by type and production phase.
- **Analysis:** Descriptive evaluation of activity patterns, compliance, and biosecurity risks.

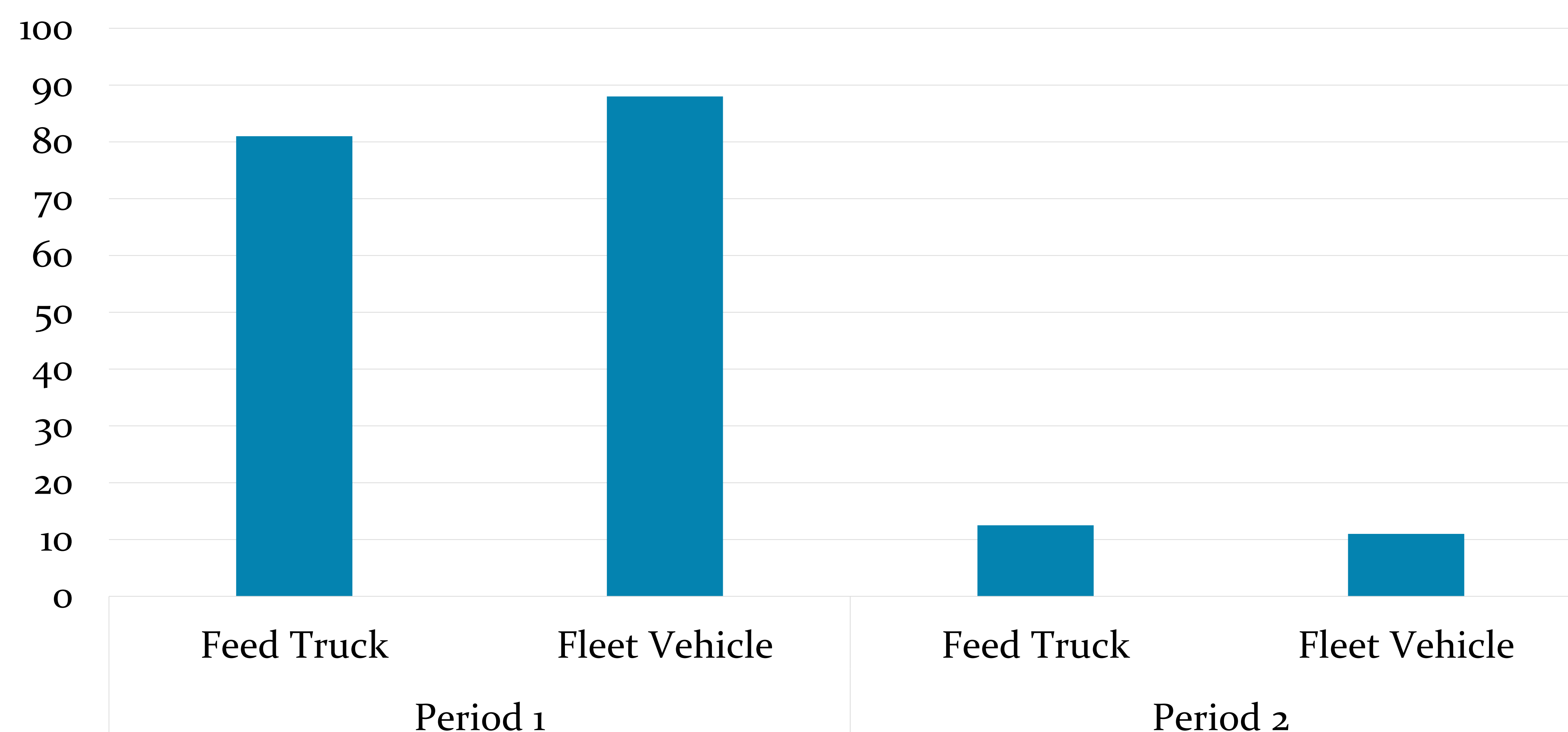
Technology for Compliance

- Compliance with vehicle routing, downtime, and other biosecurity practices remains under-monitored due to limited real-time data.
- Digital platforms like **Farm Health Guardian** can automate movement tracking and downtime enforcement.

Results

- FHG improved visibility of transportation-related biosecurity compliance, though refinements were required (geofence adjustments, GPS verification, timely health status updates).
- Median weekly feed truck breaches declined from 81 → 12.5; fleet vehicle breaches declined from 88 → 11 between Periods 1 and 2.
- Breach counts were similar across different biosecurity health statuses.
- FHG generated outbreak reports to model exposure timelines and identify high-risk contacts.

Median Biosecurity Breaches by Study Period



Conclusions

Real-time GPS monitoring improves transportation biosecurity compliance and breach awareness. Broad adoption of this technology could strengthen protocol adherence and support more effective disease prevention across swine production systems.