

# Evaluating the Importance of Biosecurity in Swine Operations

Lindsey Lemley, Lilly Rogers, Austin Calhoun

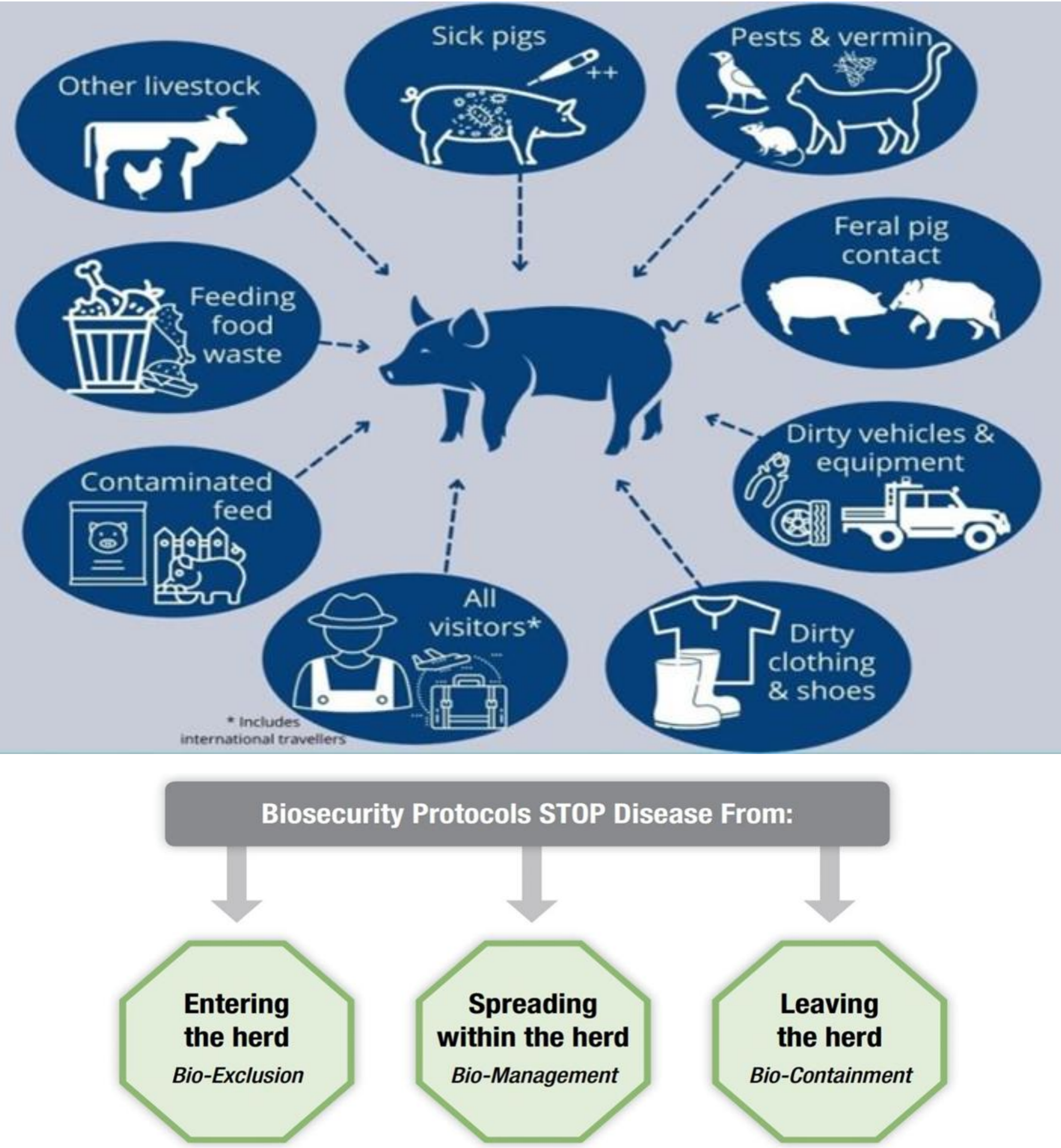
Arkansas Tech University

Department of Agriculture and Tourism

## Introduction

In 2021 alone, the US pork industry supported \$35 billion in labor income in addition to \$57.2 billion of gross national product<sup>1</sup>. With the swine industry being a multi-billion dollar industry, it is therefore critical to protect the swine within the operations from the threat of disease and the producers from financial losses associated with disease outbreaks. Biosecurity is the practice of management procedures the prevent the introduction of new diseases and the spread of existing diseases in swine operations<sup>2</sup>. In recent years, biosecurity practices have improved due to the increased regulation and commercialization of the swine industry. In this study we aim to:

- Discover the key differences in biosecurity practices among different-sized swine operations
- Observe minimum requirements to maintain swine herd health
- Note important factors impacting swine herd health such as operation location, biosecurity protocol enforcement, etc.



## Methods

Three swine farms, each with a different sow population, were selected as subjects for this study due to their location in Arkansas and their willingness to disclose information about their management practices. The confidentiality of each operation was protected via the assignment of pseudonyms in accordance with Arkansas Tech University Institutional Review Board (IRB) regulations. Data was collected via an interview process using a pre-prepared questionnaire. The manager of Farm A, the owner of Farm B, and a worker from Farm C were interviewed as chosen representatives of each operation. The same questionnaire was used during each interview to prevent biases and maintain efficiency in data collection.

## Analysis

Interview results were organized into a table to allow for comparative analysis to be conducted regarding the prevalent differences amongst the studied swine operations. Each interview question was categorized into those which are human-influenced and those which are based on facility management practices. All yes/no responses were utilized to run a two factor ANOVA test without replication in Microsoft Excel. This analysis was used to statistically determine if there were any significant differences in biosecurity among the three operations.

## Findings/Results

Table 1: Biosecurity features and their utilization and enforcement on three swine farms in Arkansas

Biosecurity Features and Utilization			
	Farm Name		
	Farm A	Farm B	Farm C
Sow Population	14	585	3,000+
Human-Influenced Biosecurity Feature	Method Utilized (Yes or No)		
Footbath	Yes	No	No
Sign-in/Sign-out	Yes	Yes	Yes
Farm Workers are Not Allowed to Work with Other Swine	Yes	Yes	Yes
Shower-in/Shower-out	No	Yes	Yes
Disposable PPE	Yes	No	Yes
Change into Work Uniform	No	Yes	Yes
Worker Flow from Youngest to Oldest	No	Yes	Yes
Enforcement Level			
Biosecurity Protocol	Loose	Moderate	Strict
Facility Management Biosecurity Feature	Method Utilized (Yes or No)		
All-in/All-out	No	Yes	No
Isolation/Acclimation	No	Yes	Yes
Internally Sourced Replacement Gilts	No	Yes	No
Genetics Introduced via Semen	Yes	Yes	Yes
Rodent Blocks	Yes	Yes	Yes
Vaccination	Yes	Yes	Yes
Insecticides	Yes	Yes	Yes
Farm Budget Broken into Specific Categories	No	Yes	Yes
Farm Isolated from Other Swine Operations	Yes	Yes	Yes
Frequency			
Facility Cleaning	Weekly	Every 6 months	Weekly
Incidence of Disease	Rare	Rare	Rare
Sanitation/Disinfection Type			
Cleaning Equipment	Pressure Washer	Pressure Washer	Pressure Washer
Disinfecting Agent	Parvasol	Rotate three classes of disinfectants	Synergize and Tek-Trol

Table 2: Biosecurity feature usage average and variance among three swine farms in Arkansas

Biosecurity Feature	Farm A	Farm B	Farm C	Average Use of Feature	Variance
Footbath	1	0	0	0.33	0.33
Sign-In/Sign-out	1	1	1	1.00	0.00
Farm Workers are Not Allowed to Work with Other Swine	1	1	1	1.00	0.00
Shower-in/Shower-out	0	1	1	0.67	0.33
Disposable PPE	1	0	1	0.67	0.33
Change into Work Uniform	0	1	1	0.67	0.33
Worker Flow from Youngest to Oldest	0	1	1	0.67	0.33
All-in/All-out	0	1	0	0.33	0.33
Isolation/Acclimation	0	1	1	0.67	0.33
Internally Sourced Replacement Gilts	0	1	0	0.33	0.33
Genetics Introduced via Semen	1	1	1	1.00	0.00
Rodent Blocks	1	1	1	1.00	0.00
Vaccination	1	1	1	1.00	0.00
Insecticides	1	1	1	1.00	0.00
Farm Budget Broken into Specific Categories	0	1	1	0.67	0.33
Farm Isolated from Other Swine Operations	1	1	1	1.00	0.00

### Key findings:

1. Isolation from other swine operations, sign-in/sign-out, semen for genetics introduction, rodent blocks, vaccinations, and insecticides were utilized by all three operations
2. Enforcement of biosecurity protocols varied among the three farms and was related to the sow population in each operation
3. All three farms reported that disease incidence was rare
4. No significant differences ( $p = 0.34$ ) in biosecurity existed among the three operations

## Discussion / Conclusion

**Hypothesis:** a swine operation with sufficient biosecurity measures will have better herd health and a lower incidence of diseases than an operation with ill-defined biosecurity measures.

This hypothesis was not supported by the collected data. Some possible explanations include:

- Disease incidence was rare, and all three operations had a similar herd health status which made it difficult to compare how biosecurity impacted disease outbreaks
- The limited number of swine within the state of Arkansas (134 thousand)<sup>3</sup> as compared to states with higher swine populations such as Iowa (23.5 million) or Minnesota (8.9 million)<sup>4</sup>
- Isolation of each operation was a key factor in maintaining swine herd health
- Biosecurity features utilized by all three operations appeared to be sufficient in maintaining herd health

## Acknowledgments

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- Diagrams:**
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