



JOURNAL OF THE NACAA

ISSN 2158-9459

VOLUME 19, ISSUE 1 – JUNE, 2026

Editor: Bindu Poudel-Ward

Zangaro, C.¹, LaPorte, J.² and Knight, C.³

¹Swine Production Educator, Michigan State University Extension, Alma, Michigan, 48801

²Farm Business Management Educator, Michigan State University Extension, Cassopolis, Michigan, 49031

³Associate Extension Professor and State Livestock Specialist, University of Maine Extension, Orono, Maine, 04469

Bridging the Education Gap for Small Swine Producers and Veterinarians through Survey and Resource Development

Abstract

Consolidation in the U.S. swine industry has reduced access to education and veterinary support for small-scale producers despite rising demand for local pork. This project identified knowledge gaps in herd health, biosecurity, and medication use through surveys and focus groups with 155 participants across 22 states. Respiratory disease was the top concern for both producers (60%) and veterinarians (72%), while veterinarians more frequently identified gastrointestinal and parasitic issues ($p < 0.05$), indicating gaps in disease recognition. Extension resources were developed to improve decision-making, strengthen collaboration, and enhance biosecurity, supporting the sustainability of small-scale operations.

Abbreviations: AASV: American Association of Swine Veterinarians, MSU: Michigan State University, OSR: Office of Survey Research, VCPR: Veterinarian-Client-Patient Relationship, PLE: Porcine Lawsonia Enteritis, QR: Quick Response (code)

Keywords: small-scale swine production; herd health management; biosecurity; veterinary education; Extension programming; producer knowledge gaps; antibiotic stewardship

Introduction

For this project, small (<100 head marketed annually) and mid-sized (100–999 head marketed annually) swine operations are defined as representing independent and diversified producers, a group increasingly affected by ongoing industry consolidation. Many of these farms no longer have easy access to specialized training or veterinary support. At the same time, more consumers are seeking pork from local farms or farm-to-table sources (See, 2024). Meeting this demand requires more than raising pigs; it requires hands-on experience, animal knowledge, and daily farm management (Sadowski, Talwar, Fischer, and Merritt, 2023). To effectively support these farms, a clearer understanding of how small-scale operations function across the United States is needed.

Pork from smaller farms typically stays in local markets, making it difficult to expand into larger markets. Many producers also struggle with basic livestock management, including handling pigs safely, maintaining herd health, and adhering to biosecurity protocols (Agrawal, Bromfield, and Varga, 2025; Pork, 2023). These challenges are especially relevant to Extension professionals, who are often the primary source of science-based livestock education for small-scale producers. Targeted education can help address these gaps. For example, producers often need guidance on using medications correctly, maintaining a VCPR, implementing biosecurity measures, detecting disease early, keeping accurate records, and following quarantine procedures (Animal Agriculture, 2023). While larger operations tend to have these practices well established, smaller or niche farms can find it difficult to maintain consistency.

Veterinarians working with small herds face similar obstacles. Many now work exclusively with large swine companies, leaving fewer options for small producers. Rural or mixed-practice veterinarians often treat multiple animal species and may have limited experience with swine-specific health and biosecurity needs (Sadowski, Talwar, Fischer, and Merritt, 2023). Because pig and poultry operations require strict biosecurity, these gaps can increase the risk to small herds (National Pork Board, 2020). Understanding these shared challenges is critical for developing Extension programming that effectively supports both producers and veterinarians. This project aims to identify knowledge gaps among small-scale swine producers and veterinarians regarding herd health, with a focus on biosecurity and overall herd health practices.

Methods

Objective 1: Assessing the Small Swine Producers' Knowledge

A survey (Table 1), including a consent paragraph, was developed to assess the knowledge and practices of small swine producers across the U.S., with a focus on herd health, biosecurity, and day-to-day management. Extension educators distributed physical surveys at conferences, during in-person meetings, and electronically through social media outlets and email.

The Michigan State University Office of Survey Research obtained a sample of potential respondents from the Dynata database, which contains contact records for individuals in participating states (Iowa, Nebraska, Maine, Michigan, and Pennsylvania). Respondents were screened to identify small- and medium-scale swine producers, defined for this project as operations marketing fewer than 1,000 pigs annually (small: <100 head; medium: 100–999 head). Additional eligibility criteria included current involvement in swine production and participation in either direct-to-consumer or commercial marketing channels. The resulting sample served as the recruitment frame for survey participation. Producers received letters explaining the study, including a QR code linking to a

screening questionnaire. Eligible participants completed the full survey and could provide an email to receive a \$20 gift card. An additional \$10 was offered for referring other eligible farmers. Paper surveys were also provided to ensure full accessibility.

A focus group was conducted in 2024 at the World Pork Expo with small- and medium-scale swine producers. Participants were identified and recruited through purposive sampling by Extension educators across multiple states engaged in the grant project to ensure representation of diverse operation sizes and management approaches. The focus group protocol guided discussion on perceived knowledge gaps and practical herd management challenges. Differences between producer and veterinarian responses were evaluated using two-proportion z-tests to compare frequencies of reported health concerns.

Table 1: Survey questionnaire

	Swine Producer Survey
Q1. What state is your farm located in?	Open-ended question
Q2. What best describes your main goal for raising pigs?	<ul style="list-style-type: none"> • I raise pigs to feed my myself and/or my family • I raise pigs for exhibition or 4-H • I raise pigs for freezer meat or direct sales • I raise pigs for breeding and/or genetics • I raise pigs for commercial markets • I have pigs as pets • I have an interest in the topic but do not currently own pigs
Q3. What is the annual average pig inventory in your current swine operation?	Open-ended question
Q4. What best describes the primary market of your swine operation? (Select all that apply)	<ul style="list-style-type: none"> • Markets (Pigs that are marketed and slaughtered for pork production) • Show and/or fair pigs (Pigs that are raised for show or exhibition purposes) • Breeding only (Pigs that are maintained for breeding purposes) • Breed to Wean (Pigs that are raised for breed and offspring sold after weaning) • Farrow to Finish (Pigs that are bred and offspring are finished out to slaughter weight) • Specialty (Pigs that are bred and sold in non-commercial markets. i.e., farmers' markets, direct restaurant sales)

	<ul style="list-style-type: none"> • Agri-tourism (Farms that provide tours and experiences on a pig farm to educate visitors) • Other (please explain below) _____
<p>Q5. What major health concerns have you seen in your client's swine operations? (Select all that apply)</p>	<ul style="list-style-type: none"> • Lameness • Reproductive • Respiratory • Skin Issues • Parasites • Scours/Diarrhea • Poor Body Condition • Central Nervous System issues (i.e., strep) • Death loss (all production stages)
<p>Q6. Have you used antibiotics on your pigs within the last year?</p>	<ul style="list-style-type: none"> • Yes • No
<p>Q7. If yes, what type of antibiotics?</p>	<ul style="list-style-type: none"> • In-feed • In-water • Injectable • All of the above
<p>Q8. What statement below best describes your understanding of the Veterinarian Feed Directive (VFD) guidelines?</p>	<ul style="list-style-type: none"> • I am not at all familiar with the VFD guidelines for the use of medications in food production animals • I am aware of the guidelines, but have not implemented them on my farm

	<ul style="list-style-type: none"> • I understand the VFD guidelines, and my farm follows these guidelines
<p>Q9. Do you use vaccines?</p>	<ul style="list-style-type: none"> • Yes • No
<p>Q10. If yes, what pig diseases are you trying to prevent by using vaccines? (Select all that apply)</p>	<ul style="list-style-type: none"> • Swine Influenza • Circovirus (PCV2) • Mycoplasma Hyopneumoniae • Leptospirosis, Erysipelas, Parvo (PLE) • E. Coli • PRRSv • Clostridium • Rotavirus or Coronavirus • Ileitis • Unknown • Other_____
<p>Q11. Have you ever had a significant disease outbreak on your farm? (Please write the approximate number of outbreaks, suspected disease, and results of the outbreak)</p>	<p>Open-ended question</p>
<p>Q12. Do you practice any biosecurity measures on your farm?</p>	<ul style="list-style-type: none"> • Yes • No

<p>Q13. Do you have a working relationship with a veterinarian for your pigs?</p>	<ul style="list-style-type: none"> • Yes • No
<p>Q14. If not, then why?</p>	<ul style="list-style-type: none"> • Veterinarian is not within driving range of my farm • Veterinarian within driving range does not have any swine experience • I do not choose to interact with veterinarians
<p>Q15. When was the last time a veterinarian was out on your farm?</p>	<ul style="list-style-type: none"> • Within the last one month • Within the last six months • Within the last year • Over a year ago or more
<p>Q16. Did you have a veterinarian out on your farm</p>	<ul style="list-style-type: none"> • Routine pig care • Emergency pig care • Both
<p>Q17. Does your veterinarian have training in swine?</p>	<ul style="list-style-type: none"> • Yes • No
<p>Q18. Do you utilize body condition scoring on your farm?</p>	<ul style="list-style-type: none"> • Yes • No
<p>Q19. Do you feed food waste to your pigs?</p>	<ul style="list-style-type: none"> • Yes • No
<p>Q20. Do you feed your pig by-products? (i.e., brewers' grains, potatoes, milk waste)</p>	<ul style="list-style-type: none"> • Yes • No

<p>Q21. What sources do you use for your pig feed? (Select all that apply)</p>	<ul style="list-style-type: none"> • Purchase complete feed • Home mixed ration, with purchase of concentration and/or vitamin and mineral premix • Home mixed ration, with NO purchased concentrate and/or vitamin and mineral premix • Food waste is NOT sourced from home on the same premises (i.e., plate waste from industry, including raw vegetables or milk waste products, or restaurants containing meat or that had contact with meat) • Food waste is sourced from home on the same premises (i.e., plate waste and waste from home on the same property as the pigs reside) • Other _____
<p>Q22. What education or knowledge about pig production would you like to know? (Select all that apply)</p>	<ul style="list-style-type: none"> • Nutrition • Biosecurity • Health • Housing/Pasture • Environmental (manure management, soil and water conservation) • Reproduction • Genetics • Marketing • Home processing

Objective 2: Assessing the Small Swine Herd Veterinarians' Knowledge

A similar survey (Table 2) was distributed to veterinarians who work with small swine herds to assess their knowledge of client herd health, with an emphasis on biosecurity. QR codes linking to the survey were sent to members of the American Association of Swine Veterinarians (AASV). A focus group was conducted in 2024 at the World Pork Expo with veterinarians serving small-herd swine operations. Participants were recruited through purposive sampling by Extension educators from multiple states engaged in the grant project to ensure representation of diverse practice settings. A structured discussion guide was used to elicit perspectives on challenges in supporting small-scale producers and gaps in veterinary education and resources.

Table 2: Questionnaire to assess the small swine herd veterinarians' knowledge

Table 2	Swine Veterinary Survey
Q1. What state is your practice located in?	Open-ended question
Q2. What county is your practice located in?	Open-ended question
<p>Q3. What best describes the type of swine operations you work with consistently? (Select all that account for 10% or more of your business)</p>	<ul style="list-style-type: none"> • I provide services for large production systems raising pigs for the commercial market • I provide services for small (>100) to mid-sized farms • I provide services for farmers (or youth) raising pigs for exhibition and 4-H purposes • I provide services for farmers raising pigs for freezer meat, family operations, or direct sales • I provide services for farmers raising pigs for breeding and genetic purposes • I provide services for individuals with 10 or fewer pigs as pets
<p>Q4. What is the average inventory of pigs your clients keep on their farms yearly?</p>	<ul style="list-style-type: none"> • 0-10 pigs • 11-30 pigs • 31-100 pigs • 101- 250 pigs • 251 pigs to 999 pigs • over 1,000 pigs
<p>Q5. What major health concerns have you seen in your client's swine operations? (Select all that apply)</p>	<ul style="list-style-type: none"> • Lameness • Reproductive • Respiratory • Skin Issues

	<ul style="list-style-type: none"> • Parasites • Scours/Diarrhea • Poor Body Condition • Central Nervous System issues (i.e., strep) • Death loss (all production stages)
<p>Q6. Which statement best describes your understanding of the Veterinarian Feed Directive (VFD) guidelines?</p>	<ul style="list-style-type: none"> • I am not at all familiar with the VFD guidelines for the use of medications in food production animals • I am aware of the guidelines, but have not implemented them on my client's farms • I understand the VFD guidelines, and my client's farms follow these guidelines
<p>Q7. Do you recommend/prescribe vaccines to your swine clients?</p>	<ul style="list-style-type: none"> • Yes • No
<p>Q8. If yes, what vaccines do you typically recommend/prescribe? (Select all that apply)</p>	<ul style="list-style-type: none"> • Swine influenza • Circovirus (PCV2) • Mycoplasma Hyponeumoniae • Leptospirosis, Erysipelas, Parvo (PLE) • E. Coli • PRRVs • Clostridium • Rotavirus or Coronavirus • Ileitis

	<ul style="list-style-type: none"> • Other _____
<p>Q9. Have you have responded to a significant swine disease outbreak on a swine farm? (Please write the approximate number of outbreaks, types of outbreaks, and response plans.)</p>	Open-ended questions
<p>Q10. Do you use body condition scoring when assessing clients' pigs?</p>	<ul style="list-style-type: none"> • Yes • No
<p>Q11. Do you practice biosecurity measures on swine farms?</p>	<ul style="list-style-type: none"> • Yes • No
<p>Q12. How frequently do you typically visit swine farms?</p>	<ul style="list-style-type: none"> • Monthly • Every 6 months • Yearly • When new stock arrives • Emergencies only
<p>Q13. Do you have training in swine and feel comfortable when out on a swine farm?</p>	<ul style="list-style-type: none"> • Yes • No
<p>Q14. What education or knowledge about pig production would YOU like to share? (Select all that apply)</p>	<ul style="list-style-type: none"> • Nutrition • Biosecurity • Health • Housing/Pasture • Environmental (manure handling, soil and water management) • Reproduction

	<ul style="list-style-type: none"> • Genetics • Marketing • Home Processing
<p>Q15. What education or knowledge about pig production do you believe your swine clients need? (Select all that apply)</p>	<ul style="list-style-type: none"> • Nutrition • Biosecurity • Health • Housing/Pasture • Environmental (manure handling, soil and water management) • Reproduction • Genetics • Marketing • Home Processing

Objective 3: Creating Educational Resources

Survey and focus group findings informed the development of educational materials addressing gaps in antibiotic use, biosecurity, and animal welfare. Resources included written articles, tip sheets, 2–5-minute instructional videos, and podcast episodes hosted by Iowa’s PigX and Maine FarmCast. Ten videos and five podcast episodes were produced to support improved swine management and sustainable practices.

Results

The project produced a range of educational materials designed to support small- and mid-sized swine producers and veterinarians (Tables 3 and 4). Survey responses

included 98 producers across 22 states and 18 veterinarians across 9 states, revealing variability in biosecurity adoption, disease recognition, and management practices.

Respiratory disease was the most reported concern among both producers (60%) and veterinarians (72%), with no significant difference between groups ($p > 0.05$).

Reproductive issues were reported more frequently by veterinarians (61%) than producers (40%). Veterinarians were significantly more likely to report scours/diarrhea (61%, $p < 0.01$) and parasites (50%, $p < 0.05$), which were not prominently identified by producers, indicating gaps in disease recognition.

Producers reported moderate adoption of biosecurity practices (50%), with similar proportions indicating the use of food waste or by-products. Antibiotic use (60%) and vaccine use (50%) varied across operations. Educational priorities included nutrition, herd health, and biosecurity.

Written resources covered topics such as:

- Survey insights from small producers and veterinarians
- Indoor and outdoor ventilation systems
- Parasite management
- Pork yields and swine nutrition
- Production models: Bulletin E-3506 independent ownership vs. contract operations
- Livestock enterprise budgeting

Podcasts included:

- Maine FarmCast (January 2025) grant update with Casey Zangaro
- PigX Podcast (April 2025) four-episode mini-series on small-producer challenges, nutrition, and direct marketing

Short Video Topics included:

- Raising Outdoor Pasture Pigs: Land Management

- Raising Outdoor Pasture Pigs: Feeding Management
- Raising Outdoor Pasture Pigs: Housing Management
- Raising Outdoor Pasture Pigs: Manure Management
- Raising Outdoor Pasture Pigs: Water Management
- Raising Outdoor Pasture Pigs: Seasonal Management

Project Impact and Metrics

A total of 155 small-scale producers and veterinarians contributed through surveys and focus groups. Educational materials are expected to reach hundreds of stakeholders, and Spanish translations are planned to enhance accessibility. Equipment investments, such as the Sow AI breeding and farrowing tool for the University of Maine Extension, directly support producer decision-making. Collaborative efforts among MSU, Penn State, the University of Maine, the University of Nebraska–Lincoln, and Iowa State University strengthened the project’s expertise and impact.

Table 3: Online and Mail-out survey results from Small-Swine Herd Producers across the United States

Producer Survey Results	
Producer Representation	98 responses 22 states
Primary Goals for Raising Pigs	- 25.5% focus on large-scale production (Commercial Markets) - 22.6% prioritize direct sales (Freezer meat and local) - 21.9% raise pigs for exhibitions and 4-H

	<ul style="list-style-type: none"> - 6.6% emphasize breeding and genetics
Annual Pig Inventory	<ul style="list-style-type: none"> - 16% of producers have 0-100 pigs - 7% of producers have 101-250 pigs - 17% of producers 251-999 pigs
Health and Management Concerns	<ul style="list-style-type: none"> - 60% reported respiratory issues - 50% reported lameness issues - 40% reported reproductive issues <p>Top diseases: Swine Influenza and Circovirus</p>
Biosecurity and Feeding Practices	<ul style="list-style-type: none"> - 50% use biosecurity measures - 50% use food waste or food by-products
Antibiotic and Vaccine Usage	<ul style="list-style-type: none"> - 60% use antibiotics - 50% use vaccines regularly
Educational Needs	<ul style="list-style-type: none"> - Nutrition: 68% - Health: 61% - Biosecurity: 50% - Housing and Pastures: 44% - Reproduction: 44%

Table 4: Online survey results from Small-Swine Herd Veterinarians across the United States.

Veterinarian Survey Results	
Veterinarian Representation	18 responses 9 states
Primary Clients Served	- 61% serve farmers raising pigs for freezer meat, family operations, or direct sales
Health Concerns on Farms	- 72% reported respiratory issues - 61% reported reproductive issues - 61% report scours/diarrhea - 50% report parasites
Vaccination Recommendations	- 78% recommend vaccines for overall swine health - 93% recommend circovirus - 79% recommend PLE and mycoplasma - 64% recommend swine influenza
Farm Disease Outbreaks	- 44% of vets have responded to farm disease outbreaks
Routine Care Visits	- 55% of vets visit farms for routine care at least every 6 months
Comfort level around Pigs	- 68% of vets feel comfortable being around pigs

Educational Needs	<ul style="list-style-type: none">- Health: 44%- Environmental Management: 39%- Nutrition: 33%- Housing and Pastures: 33%- Reproduction: 28%
-------------------	--

Discussion

Findings from this study demonstrate both alignment and divergence between swine producers and veterinarians in perceived herd health challenges. Agreement between groups on respiratory disease, with no significant difference detected, suggests this issue is widely recognized across production systems. However, statistically significant differences in reporting gastrointestinal and parasitic conditions indicate gaps in disease recognition at the producer level.

Veterinarians were significantly more likely to identify scours/diarrhea and parasitic concerns, suggesting that these conditions may be underdiagnosed or underrecognized by producers. This discrepancy likely reflects differences in diagnostic training, access to veterinary services, or familiarity with the presentation of subclinical disease in small- and mid-sized operations.

The observed variability in biosecurity adoption and feeding practices further contributes to disease risk. Inconsistent implementation of biosecurity measures, combined with practices such as feeding food waste or by-products, may increase vulnerability to the introduction and spread of disease. These findings reinforce the importance of accessible, applied education tailored to smaller-scale systems.

The development of targeted educational materials, including videos, podcasts, and written guides, provides a practical mechanism to address these gaps. Collaboration among multiple land-grant universities ensured that materials are research-based and adaptable across regions.

Future work should focus on expanding bilingual and digital delivery methods and on incorporating evaluation strategies to assess changes in knowledge, behavior, and practice adoption over time.

Implications for Extension

This project reinforces the critical role of Extension programming in addressing knowledge gaps among small- and mid-sized swine producers and the veterinarians who support them. Statistically significant differences in disease recognition, particularly for gastrointestinal and parasitic conditions, highlight key areas where Extension education can improve producer awareness and decision-making.

Providing education through multiple formats, including short videos, podcasts, and written resources, allows Extension educators to deliver practical, accessible information to geographically dispersed audiences. These tools can be integrated into workshops, on-farm consultations, and digital platforms to enhance reach and engagement.

Engaging veterinarians in both needs assessments and educational content development is essential to ensuring consistency in herd health messaging. Strengthening collaboration between producers and veterinarians can improve disease detection, prevention, and overall herd management.

Future Extension efforts should prioritize expanding bilingual and online resources while incorporating outcome-based evaluation methods. Monitoring changes in producer

behavior and veterinary engagement will be important for demonstrating impacts on herd health, animal welfare, and farm sustainability.

Conclusion

This project demonstrates that small-scale swine producers and their veterinarians continue to face ongoing challenges in herd health management, particularly in areas such as biosecurity, disease recognition, and medication use. While agreement between groups on respiratory disease highlights shared priorities, statistically significant differences in reporting of gastrointestinal and parasitic conditions reveal important gaps in producer-level awareness.

Educational tools developed through this project, including videos, podcasts, and written resources, provide practical, accessible guidance to address these challenges. Delivering information in multiple formats improves accessibility and supports adoption across diverse production systems.

Expanding bilingual and digital resources will further enhance reach. Future evaluation efforts should focus on measuring the adoption of recommended practices and assessing long-term impacts. Strengthening knowledge and communication between producers and veterinarians will ultimately support improved herd health, enhanced animal welfare, and the long-term sustainability of small-scale swine operations.

Acknowledgements

The authors thank all small-scale swine producers and veterinarians who participated in the surveys and focus groups. Your time, insight, and openness made this project possible. We also appreciate the support of the Michigan State University Office of

Survey Research, the American Association of Swine Veterinarians, and the staff at the 2024 World Pork Expo for facilitating our contact with participants.

We are grateful to our colleagues at Michigan State University, Penn State University, the University of Maine, the University of Nebraska–Lincoln, and Iowa State University for their collaboration in developing the educational materials. Special thanks to the Extension educators, videographers, and podcast teams who contributed their expertise to produce practical resources for producers and veterinarians.

Finally, we acknowledge the funding and support from the National Pork Board and the Pork Checkoff, which made this project possible.

Conflicts of Interest

The authors declare that they have no commercial or financial relationships that could be construed as a potential conflict of interest. All research, analysis, and educational materials were conducted and produced independently to ensure objectivity and integrity.

Literature Cited

Agrawal, I., Bromfield, C., and Varga, C. (2023) Assessing and improving on-farm biosecurity knowledge and practices among swine producers and veterinarians through online surveys and an educational website in Illinois, United States. *Frontiers in Veterinary Science* 10:1167056. Accessed on November 21, 2025. <https://www.frontiersin.org/articles/10.3389/fvets.2023.1167056/full>

Animal Agriculture(2023) Veterinary feed directive – Year one in review. Michigan State University Extension. Accessed on November 21, 2025. <https://www.canr.msu.edu/news/veterinary-feed-directive-year-one-in-review-1>

National Pork Board. (2020). *We Care® biosecurity resources*. Des Moines, IA: National Pork Board.

Pork. 2023. Veterinary feed directive at 5 years: Swine producer and veterinarian survey exploring how VFD guidelines have affected swine herd health and management practices in Michigan. Michigan State University Extension. Accessed on November 21, 2025. <https://www.canr.msu.edu/news/veterinary-feed-directive-at-5-years-swine-producer-and-veterinarian-survey-exploring-how-vfd-guidelines-have-affected-swine-herd-health-and-management-practices-in-michigan>

Sadowski, N., Talwar, R., Fischer, E., and Merritt, R. (2023) Generating demand for alternative protein in low- and middle-income countries: Opportunities and experience from nutritious and sustainable market solutions.

Current Developments in Nutrition Suppl 1:101996. Accessed on November 21, 2025. <https://doi.org/10.1016/j.cdnut.2023.101996>

See, M. T. (2024) Current status and future trends for pork production in the United States of America and Canada. *Animal Bioscience* 37(4):775–785. Accessed on November 21, 2025. <https://doi.org/10.5713/ab.24.0055>