

Swine Disease Reporting System Report # 65 (July 3, 2023)

What is the Swine Disease Reporting System (SDRS)? SDRS includes multiple projects that aggregate data from participating veterinary diagnostic laboratories (VDLs) in the United States of America, and reports the major findings to the swine industry. Our goal is to share information on activity of endemic and emerging diseases affecting the swine population in the USA, assisting veterinarians and producers in making informed decisions on disease prevention, detection, and management.

After aggregating information from participating VDLs and summarizing the data, we ask for the input of our advisory group, which consists of veterinarians and producers across the US swine industry. The intent is to provide an interpretation of the observed data, and summarize the implications to the industry. Major findings are also discussed in monthly podcasts. All SDRS reports and podcasts are available at www.fieldepi.org/SDRS. The SDRS projects are:

Swine Health Information Center (SHIC)-funded Domestic Swine Disease Surveillance Program: collaborative project among multiple VDLs, with the goal to aggregate swine diagnostic data and report it in an intuitive format (web dashboards and monthly PDF report), describing dynamics of pathogen detection by PCR-based assays over time, specimen, age group, and geographical area. Data is from the Iowa State University VDL, South Dakota State University ADRDL, University of Minnesota VDL, Kansas State University VDL, and Ohio Animal Disease and Diagnostic Lab.

Collaborators:

Swine Disease Reporting System office: Principal investigators: Daniel Linhares & Giovani Trevisan; Project coordinator: Guilherme Cezar, Communications: Edison Magalhães, Data analyst: Srijita Chandra.

Iowa State University: Gustavo Silva, Marcelo Almeida, Bret Crim, Kinath Rupasinghe, Eric Burrough, Phillip Gauger, Christopher Siepker, Marta Mainenti, Michael Zeller, Rodger Main.

University of Minnesota: Mary Thurn, Paulo Lages, Cesar Corzo, Albert Rovira.

Kansas State University: Rob McGaughey, Franco Matias-Ferreyra, Jamie Retallick, Jordan Gebhardt.

South Dakota State University: Jon Greseth, Darren Kersey, Travis Clement, Angela Pillatzki, Jane Christopher-Hennings.

Ohio Animal Disease and Diag. Lab.: Melanie Prarat, Ashley Johnson, Dennis Summers.

The Ohio State University: Andreia Arruda.

Disease Diagnosis System: A pilot program with the ISU-VDL consisting of reporting disease detection (not just pathogen detection by PCR), based on diagnostic codes assigned by veterinary diagnosticians.

PRRSView and FLUture: Aggregates PRRSV and influenza A virus diagnostic data from the ISU-VDL and reports results, metadata, and sequences.

PRRS virus RFLP and Lineage report: Benchmarks patterns of PRRSV RFLP pattern and Lineages detected at the ISU-VDL, UMN-VDL, KSU-VDL, and OH-ADDL over time by specimen, age group, and US State.

Audio and video reports: Key findings from SDRS projects are summarized monthly in a conversation between investigators and available in the form of an "audio report" and "video report" through Spotify, Apple Podcast, Google podcast, SwineCast, YouTube, LinkedIn, and the SDRS webpage.

Advisory Group: Reviews and discusses the data, providing their comments and perspectives monthly: Mark Schwartz, Paul Sundberg, Paul Yeske, Deborah Murray, Brigitte Mason, Peter Schneider, Sam Copeland, Luc Dufresne, Daniel Boykin, Corrine Fruge, William Hollis, Rebecca Robbins, Thomas Petznick and Kurt Kuecker.

In addition to this report, interactive dashboards with aggregated test results are available at www.fieldepi.org/SDRS.

Note: This report contains data up to June 30, 2023.



Figure 1. Top: Left: Results of PRRSV RT-PCR cases over time; Right: Proportion of accession ID cases tested for PRRSV by age group per year and season. Middle: Left Expected percentage of positive results for PRRSV RNA by RT-qPCR, with 95% confidence interval band for predicted results based on weekly data observed in the previous 3 years; Right: Percentage of PRRSV PCR-positive results, by age category, over time. Wean to market correspond to nursery and grow-finish. Adult/Sow correspond to Adult, boar stud, breeding herd, replacement, and suckling piglets. Unknown corresponds to not informed site type or farm category. Bottom Left: The 25 most frequently detected RFLP patterns during 2023; Right: Epidemiological curve of detection for PRRSV Lineage 1C variant strain.

SDRS Advisory Group highlights:

• Overall, 23.1% of 6,736 cases tested PRRSV-positive in June, a moderate decrease from 26.67% of 7,200 in May;

• Positivity in the adult/sow category in June was 22.29% (616 of 2,764), similar to 23.17% (688 of 2,969) in May;

• Positivity in the wean-to-market category in June was 31.26% (719 of 2,300), a substantial decrease from 36.94% (914 of 2,474) in May;

• Overall PRRS-percentage of positive was 3 standard deviations from state-specific baselines in OH;

• During June 2023, PRRSV L1C variant strains were detected in IA (100), MN (40), MO (14), NE (10), OH (7), SD (2) and IN (2);

• Analyzing SDRS PRRSV sequencing historical data, PRRSV L1C variant, differently from other PRRSV variants, has a trend of increasing the number of sequences detected during summer. Other PRRSV variants have a trend to decrease detection during summer;

• The advisory group highlighted that possible longer periods of shedding, high viral load in animals, and increased survivability of the PRRSV L1C variant compared to other PRRSV strains contributed to this variant persisting during the summer period infecting more animals.



SDRS Advisory Group highlights:

• Overall, 8.35% of 3,785 cases tested PEDV-positive in June, similar to 9.85% of 4,042 in May;

- Positivity in the adult/sow category in June was 8.08% (85 of 1,052), similar to 8.59% (105 of 1,223) in May;
- Positivity in the wean-to-market category in June was 10.92% (179 of 1,639), similar to 12.18% (208 of 1,708) in May;
- Overall PEDV-percentage of positive cases was 3 standard deviations from state-specific baselines in NE, MO, and NC;
- Overall, 3.02% of 3,509 cases tested PDCoV-positive in June, similar to 4.19% of 3,886 in May;
 - Positivity in the adult/sow category in June was 2.13% (21 of 984), a moderate decrease from 4.13% (49 of 1,186) in May;
 - Positivity in the wean-to-market category in June was 4.54% (68 of 1,499), similar to 5.77% (94 of 1,628) in May;
 - Overall PDCoV-percentage of positive cases was 3 standard deviations from state-specific baselines in KS and IL;

• There was 0 positive case for TGEV RNA-PCR in June, 2023 over a total of 3,407 cases tested. It has been 28 months (with a total of 94,315 cases tested) since the last TGEV PCR-positive result;

• The advisory group highlighted that increased regional activity of enteric coronaviruses (PDCoV and PEDV) during the summer is atypical. Failures in the biosecurity measures during summer, usually a period of maintenance projects in the farms, increased immunologically susceptible population, and reduction in mitigation strategies during the summer (gilt acclimation) were possible causes pointed out by the advisory group for increased enteric coronaviruses activity. Increased PEDV outbreaks were also reported in Canada during June, according to the CEZD report.



Topic 3 – Detection of *M. hyopneumoniae* DNA by PCR.





Figure 3. Top: Left MHP; MHP Case results tested by PCR over time. Right MHP PCR-positive results, by category over time. **Bottom:** expected percentage of positive results for MHP by PCR and 95% confidence interval for 2023 predicted value, based on weekly data observed in the previous 3 years.

SDRS Advisory Group highlights:

- Overall, 9.89% of 940 cases tested *M. hyopneumoniae*-positive cases in June, a moderate decrease from 13.99% of 879 in May;
 - Positivity in the adult/sow category in June was 10.57% (24 of 227), similar to 9.83% (23 of 234) in May;
 - Positivity in the wean-to-market category in June was 13.32% (55 of 413), a substantial decrease from 21.41% (79 of 369) in May;
 - Overall MHP-percentage of positive cases was 3 standard deviations from state-specific baselines in MO;



Topic 4 – Detection of Porcine Circovirus-2 DNA by PCR.



Figure 1. Top: Left: Results of PCV2 PCR cases over time; Right: PCV2 PCR-positive results, by category over time. Bottom Left: Average Ct values of PCV2 submissions by specimen; Right: Average Ct values of PCV2 tissue submissions by U.S. region; Central (IA), East Central (IL, IN, MO and WI), Eastern (AL, AR, CT, DE, FL, GA, KY, LA, MA, ME, MD, MI, MS, NC, NH, NJ, NY, OH, PA, RI, SC, TN VA, VT and WA), North Central (MN, ND and SD), Western (AK, AZ, CA, CO, HI, ID, KS, MT, NM, NV, OK, OR, TX, UT, WA and WY).

SDRS Advisory Group highlights:

- Overall, 37.61% of 710 cases tested PCV2-positive in June, a moderate decrease from 40.12% of 845 in May;
 - Positivity in the adult/sow category in June was 30.06% (98 of 326), a substantial decrease from 36.14% (159 of 440) in May;
 - Positivity in the wean-to-market category in June was 47.37% (144 of 304), similar to 48.62% (158 of 325) in May;

• In the month of June, the regions with the lowest PCV2 average Ct values was Central (45 submissions; average Ct 20.6), East Central (21 submissions; average Ct 23.9), Western (5 submissions; average Ct 23.9), North Central (24 submissions; average Ct 24.3), and Eastern (22 submissions; average Ct 24.4);



Topic 5 – Detection of Influenza A Virus (IAV) RNA by RT-PCR.





Figure 3. Top: Left Results of IAV PCR cases over time. Right Percentage of IAV PCR-positive results, by category over time. Bottom: Number of IAV subtyping PCR detection over time; (Partial - only hemagglutinin or neuraminidase region detected; Mixed - 3 or more haemagglutinin and neuroamnidase regions detected. i.e., "H1 H3 N1").

SDRS Advisory Group highlights:

- Overall, 32.31% of 2,222 cases tested IAV-positive cases in June, a moderate decrease from 34.55% of 2,457 in May;
 - Positivity in the adult/sow category in June was 31.71% (111 of 350), similar to 33.48% (155 of 463) in May;
 - Positivity in the wean-to-market category in June was 36.07% (404 of 1,120), similar to 37.91% (420 of 1,108) in May.
- Overall, 3.06% of 654 samples had mixed subtype detection in June, similar to 4.8% of 771 in May;





Topic 6 – Confirmed tissue cases etiologic/disease diagnosis at the ISU-VDL.



Figure 4. ISU-VDL most frequent overall confirmed tissue disease diagnosis. The presented system is described in the title of the chart. Colors represent one agent; line intersections present diagnosis of 2 or more agents within a submission. Only the most frequent etiology/disease are presented. Less frequent etiology/disease are grouped as "other". Non-confirmed diagnoses are not presented.

This work is made possible due to the commitment and teamwork from the ISU-VDL diagnosticians who assign standardized diagnostic codes to each case submitted for histopathology: Drs. Almeida, Burrough, Derscheid, Gauger, Harm, Magstadt, Mainenti, Michael, Piñeyro, Schumacher, Siepker, and previous VDL diagnosticians who have contributed to this process.

Note: Disease diagnosis takes 1 to 2 weeks to be performed. The graphs and analysis contain data from May. 1 to June. 23, 2023.

SDRS Advisory Group highlights:

• PRRSV (391) led cases with confirmed etiology, followed by *S. suis* (259), and Influenza A (170). PRRSV (364 of 1159) led the number of confirmed respiratory diagnoses, Rotavirus (129 of 472) lead the number of confirmed digestive diagnoses, and *S. suis* (42 of 69) led the number of confirmed neurological diagnoses.

• During the weeks of May 15th and 22nd there were spikes in the number of Trueperella pyogenes confirmed diagnosis;

• Even though there was a small number of cases, during the weeks of June 6th and 19th there were spikes in the number of *Lawsonia* intracelullaris confirmed diagnosis.



Note: The SDRS is a collaborative project among multiple VDLs in the US swine industry. The VDL collaborators and industry partners are all invited to submit content to share on this bonus page related to disease prevention, control, and management. Stay tuned for more content in future editions.

USDA grant expands the Swine Disease Reporting System, increasing the capability of detect swine disease trends

U.S Department of Agriculture - National Institute of Food and Agriculture (USDA-NIFA) More information: USDA-NIFA

Emerging and re-emerging biological animal health threats imperil U.S. food sovereignty. Rapid detection, response, and recovery of threatening diseases requires a robust and coordinated diagnostic infrastructure corroborated with active monitoring and surveillance systems. There is a unique opportunity to pursue syndromic surveillance using data from veterinary diagnostic laboratories (VDLs).

Closely monitoring consolidated VDL data enables early detection of abnormal pathogen activity & raises stakeholders' awareness. Strategic collaborations between five National Animal Health Laboratory Network-accredited VDLs, universities, and key industry stakeholders led to the Swine Disease Reporting System. The SDRS networking capability collects, collates, and monitors diagnostic data relating to seven infectious agents in U.S. swine herds. This work will leverage and refine the SDRS syndromic surveillance tools to create an optimal system for addressing vulnerabilities in detecting pathogens threatening U.S. swine production.

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Extension and outreach practices developed in partnership with swine stakeholders will early notify stakeholders of emerging threats, allowing rapid implementation of countermeasures to contain the further disease spread in the U.S. swine population.

Educational efforts will train the next generation of students and cultivate future leaders who will become engaged in animal livestock production. In summary, this project will develop and implement next-generation syndromic surveillance tools and capabilities for the early detection of imminent threatening agents or diseases to U.S. livestock production

In summary, this project will develop and implement next-generation syndromic surveillance tools and capabilities for the early detection of imminent threatening agents or diseases to U.S. livestock production. Rapid detection and stakeholders' awareness of emerging livestock pathogens will help to protect our food supply chain and sovereignty.