





Swine Disease Reporting System Report # 47 (January 4, 2022)

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 (USA), and reports the major findings to the swine industry. Our goal is to share information on 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 the input of our advisory group, which consists of veterinarians and producers across the USA 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 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, and Kansas State University VDL.

Collaborators:

Swine Disease Reporting System office: Principal investigator: Daniel Linhares, Project coordinator: Giovani Trevisan, Communications: Edison Magalhães.

Iowa State University: Gustavo Silva, Bret Crim, Kent Schwartz, Eric Burrough, Phillip Gauger, Pablo Pineyro, Christopher Siepker, Alyona Michael, Panchan Sitthicharoenchai, Rodger Main.

University of Minnesota: Mary Thurn, Paulo Lages, Cesar Corzo, Jerry Torrison.

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

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

Ohio Animal Disease and Diagnostic Lab.: Melanie Prarat, William Hennessy, Yan Zhang, 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.

FLUture: Aggregates influenza A virus (IAV) 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, USA state, specimen, and age group.

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 SwineCast, YouTube, LinkedIn, and the SDRS webpage.

Advisory Group: Reviews and discusses the data, providing their comments and perspectives on a monthly: Mark Schwartz, Paul Sundberg, Paul Yeske, Tara Donovan, Deborah Murray, Scott Dee, Melissa Hensch, Brigitte Mason, Peter Schneider, Sam Copeland, and Luc Dufresne.

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



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 corresponds 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 druing 2021; *right* Epidemiological curve of detection for PRRSV Lineage 1C variant strains.

SDRS Advisory Group highlights:

• Overall, 30.67% of 7,285 cases tested PRRSV-positive in December, a moderate increase from 27.41% of 6,826 in November;

- Positivity in adult/sow category in December was 26.7% (916 of 3,431), a moderate increase from 21.96% (702 of 3,196) in November;
 - Positivity in wean-to-market category in December was 42.64% (924 of 2,167), similar to 41.03% (828 of 2,018) in November;

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

• During December 53.5% (94) of the PRRSV L1C variant strains were detected in IA and other 39.1% (68) in MN. Other detection occurred in SD, NE, CO, MO, Wi, Mi;

• Recent activity of a contemporary PRRSV strain classified as Lineage 1A RFLP 1-7-4 in the states of IN, IL, and OH have been detected;

• A moderate increase in detection of PRRSV in breeding herds occurred in December, and agreed with past reports that have highlighted that spike in grow-finish pigs (seen since September) usually is followed by increased activity in breeding herds;

• The advisory group has highlighted that during recent months severe PRRSV breaks associated with the newly emerging L1C variant starin but also with other contemporary starins have occurred:

• A mixed reporting of experiences with success and failures covering strategies like usage of PRRSV MLV vaccines, aggressive treatment for secondary infections have been reported for either emerging and or contemporary PRRSV strains.



SDRS Advisory Group highlights:

• Overall, 9.75% of 3,363 cases tested PEDV-positive in December, a moderate increase from 7.52% of 3,230 in November;

• Positivity in adult/sow category in December was 8.92% (90 of 1,009), a moderate increase from 5.9% (59 of 1,000) in November;

• Positivity in wean-to-market category in December was 13.96% (192 of 1,375), a moderate increase from 11.34% (147 of 1,296) in November;

• The overall PEDV-percentage of positive cases was 3 standard deviations from state-specific baselines in IL and OK;

- Overall, 2.44% of 3,194 cases tested PDCoV-positive in December, similar to 1.98% of 3,084 in November;
 - Positivity in adult/sow category in December was 1.78% (17 of 953), similar to 1.26% (12 of 952) in November;
 - Positivity in wean-to-market category in December was 2.91% (38 of 1,305), similar to 2.93% (36 of 1,230) in November;
- Overall PDCoV-percentage of positive cases was 3 standard deviations from state-specific baselines in all 10 monitored states;
 There was 0 positive case for TGEV RNA in December, 2021 over a total of 3,132 cases tested;
- There was a positive case for FGEV have a local of 3,152 cases tested;

• The advisory group has suggested that the decrease in detection of enteric coronavirus is not enough to structure and support broad elimination strategies. Even though lots have been done, there is still a need for a more broad approach to supporting proactive surveillance, biocontainment, truck wash, and sanitation measures, especially for finishing pigs, are needed before a discussion to implement a successful control and elimination program.



95 % predicted confidence interval — Predicted % of positive — Observed % positive

Figure 3. Left top: results of M. hyopneumoniae (MHP) PCR cases over time. Right top: percentage of MHP PCR-positive results, by category over time. Bottom: expected percentage of positive results for MHP by PCR and 95% confidence interval for 2020 predicted value, based on weekly data observed in the previous 3 years.

SDRS Advisory Group highlights:

• Overall, 16.15% of 706 cases tested *M. hyopneumoniae*-positive in December, a substantial decrease from 21.79% of 693 in November;

• Positivity in adult/sow category in December was 13.48% (12 of 89), a marked decrease from 35.4% (40 of 113) in November;

• Positivity in wean-to-market category in December was 18.23% (72 of 395), a substantial decrease from 25.72% (98 of 381) in November;

• Overall MHP-percentage of positive was within expected state-specific baselines in all 11 monitored states;

• The advisory group considered that the recent increase in detection of *M. hyopneumoniae* is according to the expected for this time of year.



Topic 4 – 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, Rahe, Schumacher, Siepker, Sitthicharoenchai, 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 Nov. 1 to Dec. 18, 2021.

SDRS Advisory Group highlights:

• PRRSV (567) leads cases with confirmed etiology/disease, followed by *S. suis* (347), and Influenza A (258). PRRSV (524 of 1664) leads the number of confirmed respiratory diagnoses, *Rotavirus* (140 of 511) leads the number of confirmed digestive diagnoses, and *S. suis* (44 of 74) leads the number of confirmed neurological diagnosis.

• During November 1 to December 18, there was a significant increase (signal), during distinct weeks, in tissue diagnosis of digestive, repiratory, nervous, systemic, and cardiovascular-blood-endocrine-immune agents, with an uptick in diagnosis of: PRRSV, Influenza A virus, PCV2, Salmonelas, A. pleuropneumoniae, Mulbery Heart Disease, and S. suis;



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.

A 2021 Swine Disease Reporting System-SDRS retrospective

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The *SDRS* is a Swine Health Information Center SHIC-funded program. The SDRS goal is to share information on endemic and emerging diseases affecting the swine population in the U.S., assisting veterinarians and producers in making informed decisions on disease prevention, detection, and management. Currently, SDRS is the only publicly available source of swine health information from U.S. VDLs. With a database containing information for five porcine endemic agents and more than 970 thousand cases, SDRS is also positioned as one of the largest U.S. and international databases for veterinary diagnostic information. The SDRS has been providing science-based spatiotemporal information on pathogen activity with great representativeness of the U.S. swine industry. Thanks to the five VDL partners and SDRS advisory board and collabortors for all of the accomplishments during 2021.

A 2021 SDRS retrospective includes but is not limited to:

- New partnership with *Ohio Animal Disease and Diagnostic Laboratory*;
- Implementation of real-time HL7 messaging for PCR detection data from South Dakota State University Animal Disease Research & Diagnostic Laboratory;
- University of Minnesota Veterinary Diagnostic Laboratory, Kansas State University Veterinary Diagnostic Laboratory, and Ohio Animal Disease and Diagnostic Laboratory have joined Iowa State University Veterinary Diagnostic Laboratory in sharing PRRSV ORF5 sequencing information;
- Structured and incorporated an SDRS capability to report *PRRSV genotyping using RFLP and Lineages information* and its corresponding RFLP and lineage benchmarking;

Support U.S. swine-stakeholders with information on PCR detection:

- Contemporary PRRSV strains and the newly emerged L1C variant strain have kept PRRSV as a hot topic. Fortunately, we end 2021 with PRRSV detection according to the expected forecasted levels of detection;
- Overall, 8.7% of 41,376 cases tested PEDV-positive during 2021. It can be celebrated as the lowest levels of PEDV detection since 2013 PEDV introduction into the U.S;
- After detection above expected levels during the first half of 2021, PDCoV detection has returned to its expected forecasted levels of detection;
- It is great to not see TGEV around. Almost 38,000 submissions have been tested for TGEV and only 3 submissions had a TGEV positive sample;
- *M. hyopneumoniae* control and elimination startegies have been part of many U.S. swine industry discussions in 2021. Meawhile, the levels of *M. hyopneumoniae* detection have followed the expected forecasted levels of detection for 2021;

It has been a dynamic year for disease diagnosis at *Iowa State University Veterinary Diagnostic Laboratory*:

- Contemporary and emerging PRRSV strains have contributed to keep PRRSV as the highest number of porcine diagnoses;
- An increase in the diagnosis of E.coli, especially from nursery cases, was detected around the middle of the year and since there has been kept slightly above what was observed in previous years;
- Different agents including Influenza A virus, *B. bronchiseptica*, Mulberry Heart Disease, Salmonela, Porcine Circovirus-2, *P. multocida*, *G. parasuis*, and *M. hyopneumoniae* have given some signals for increased diagnosis during specific times of the year.

During 2021 SDRS generated and distributed information through:

- SDRS project website (*www.fieldepi.org/SDRS*) and online dashboards had more than 6,000 page visits;
- 12 editions of PDF, audio, and video reports have been shared through e-mail for 286 receivers from 27 organizations from 4 different countries and posted at the SDRS webpage;
- SDRS has hosted talks during the last 12 editions with 13 special guests;
- PDF reports shared at the FieldEpi LinkedIn page were visualized more than 15,000 times;
- SDRS reposts have been shared through the monthly SHIC newsletter and uploaded at the SHIC website;
- 12 editions of audio reports have been shared through the $\ensuremath{\mathsf{SwineCast}};$
- SDRS video reports were watched 745 times at a total of 3,868 minutes on the YouTube channel.

Happy 2022!!! and keep tuned for a better SDRS in 2022. As an example, we are working to incorporate Influenza A and Porcine Circovirus-2 data on the SDRS program.