

Swine Disease Reporting System

Report # 64 (June 6, 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 Sawyer, 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 May 31, 2023.

Communications and information contained in this report are for general informational and educational purposes only and are not to be construed as recommending or advocating a specific course of action.

Topic 1 – Detection of PRRSV RNA over time by RT-qPCR.

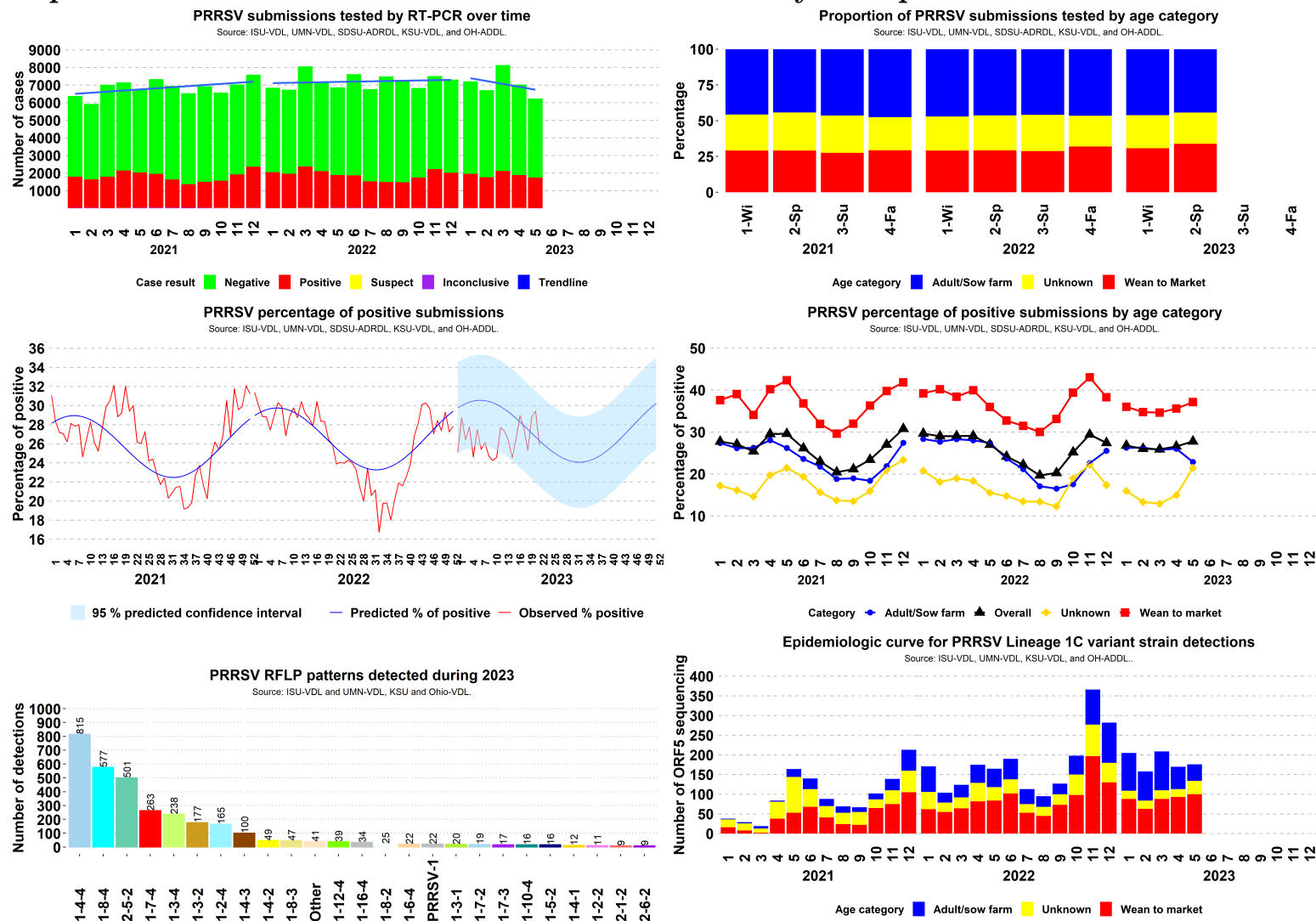


Figure 1. **Top: Left:** Results of PRRSV RT-PCR cases over time; **Right:** Proportion of accession ID cases tested for PRRSV by age group per year and season. **Middle: Left:** Expected percentage of positive results for PRRSV RNA by RT-qPCR, with 95% confidence interval band for predicted results 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 during 2023; **Right:** Epidemiological curve of detection for PRRSV Lineage 1C variant strain.

SDRS Advisory Group highlights:

- Overall, 27.78% of 6,245 cases tested PRRSV-positive in May, similar to 26.59% of 7,032 in April;
 - Positivity in the adult/sow category in May was 22.87% (615 of 2,689), a moderate decrease from 26.02% (807 of 3,101) in April;
 - Positivity in the wean-to-market category in May was 37.14% (845 of 2,275), similar to 35.61% (819 of 2,300) in April;
 - Overall PRRS-percentage of positive was within state-specific baselines in all 11 monitored states;
- During May 2023, PRRSV L1C variant strains were detected in IA (76), MO (37), MN (35), NE (15), SD (5), OH (4), IN (2), IL (1), and CO (1);
- The advisory group highlighted that the first semester of 2023 was a favorable scenario regarding PRRSV, detection was within expected and can be considered a positive period in terms of managing outbreaks. However, as routinely occurs there is still a reasonable number of breeding herds weaning positive piglets and contributing to keeping PRRSV active downstream. The downstream positivity can affect the growth-finish detection scenario in the next months.

Topic 2 – Enteric coronavirus RNA detection by RT-qPCR

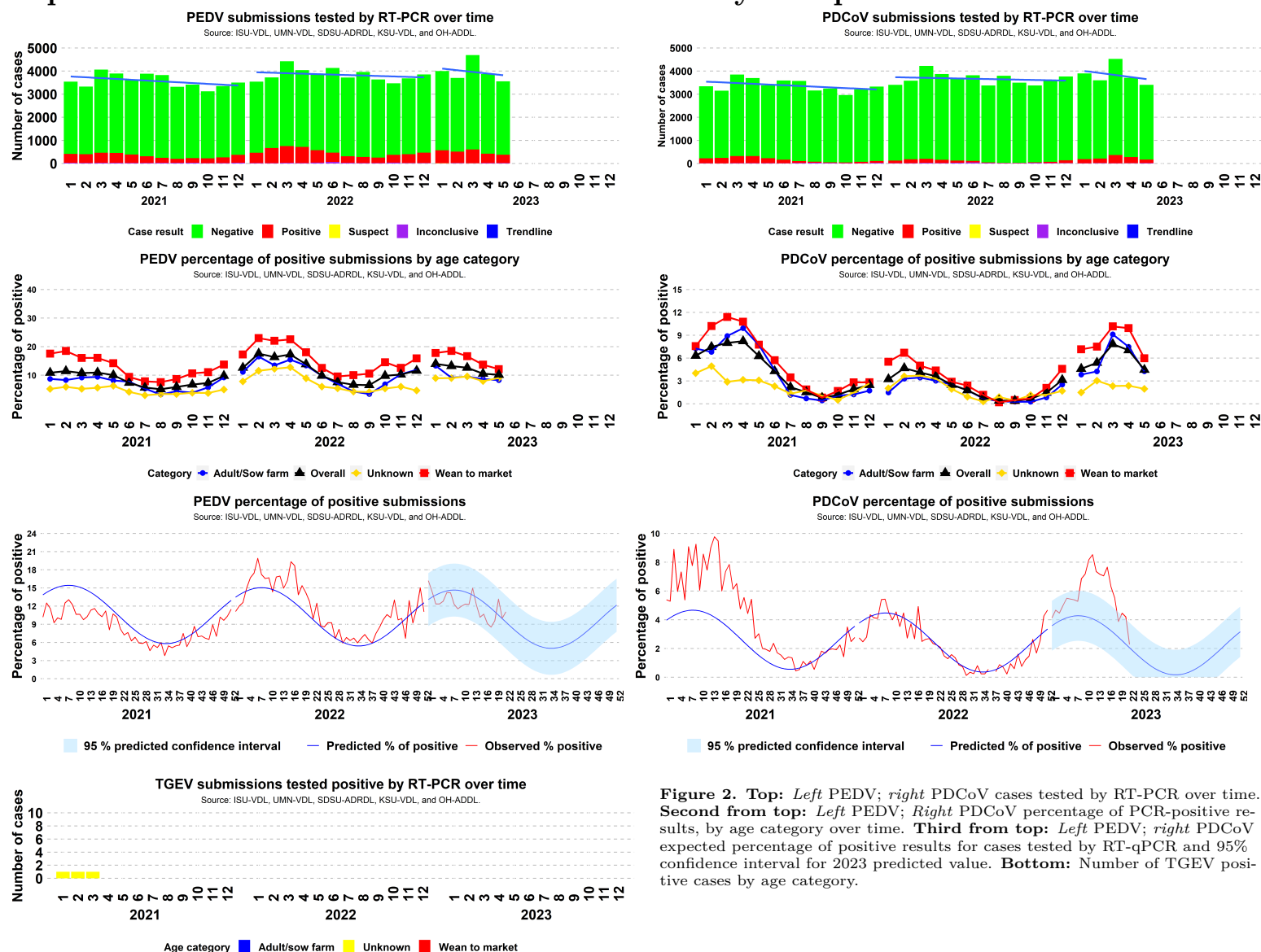
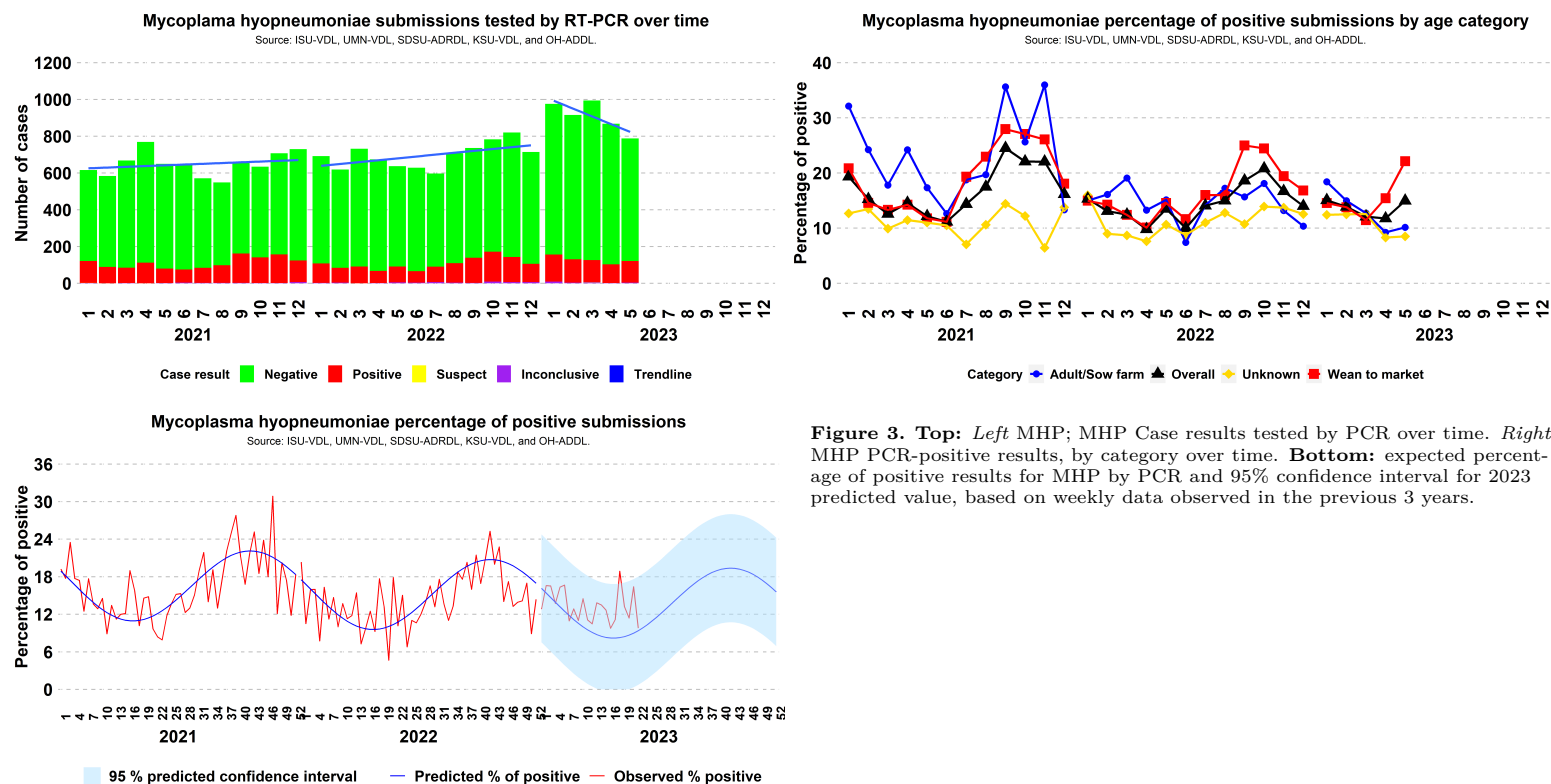


Figure 2. Top: Left PEDV; right PDCoV cases tested by RT-PCR over time. Second from top: Left PEDV; Right PDCoV percentage of PCR-positive results, by age category over time. Third from top: Left PEDV; right PDCoV expected percentage of positive results for cases tested by RT-qPCR and 95% confidence interval for 2023 predicted value. Bottom: Number of TGEV positive cases by age category.

SDRS Advisory Group highlights:

- Overall, 10.16% of 3,554 cases tested PEDV-positive in May, similar to 10.54% of 3,870 in April;
 - Positivity in the adult/sow category in May was 8.27% (94 of 1,137), similar to 8.68% (102 of 1,175) in April;
 - Positivity in the wean-to-market category in May was 12.13% (190 of 1,566), similar to 13.7% (218 of 1,591) in April;
 - Overall PEDV-percentage of positive cases was 3 standard deviations from state-specific baselines in SD, NE, MO, and NC;
- Overall, 4.46% of 3,405 cases tested PDCoV-positive in May, a moderate decrease from 7.04% of 3,707 in April;
 - Positivity in the adult/sow category in May was 4.27% (47 of 1,101), a moderate decrease from 7.49% (84 of 1,122) in April;
 - Positivity in the wean-to-market category in May was 5.97% (89 of 1,490), a moderate decrease from 9.93% (152 of 1,530) in April;
 - 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 May, 2023 over a total of 3,292 cases tested. It has been 26 months (with a total of 90,494 cases tested) since the last TGEV PCR-positive result;
- The advisory group highlighted that even though the severity of PEDV outbreaks compared with previous years was relatively the same regarding losses and clinical signs, a higher number of sow farm breaks have occurred in the states with activity above the expected (SD, NE, MO, and NC) in May, producing positive pigs downstream.

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



SDRS Advisory Group highlights:

- Overall, 14.97% of 788 cases tested *M. hyopneumoniae*-positive cases in May, a moderate increase from 11.75% of 868 in April;
 - Positivity in the adult/sow category in May was 10.14% (22 of 217), similar to 9.24% (22 of 238) in April;
 - Positivity in the wean-to-market category in May was 22.13% (77 of 348), a substantial increase from 15.42% (60 of 389) in April;
 - Overall MHP-percentage of positive cases was 3 standard deviations from state-specific baselines in MO;
- The advisory group highlighted that *Mycoplasma hyopneumoniae* detection, activity, and shedding could be associated with the simultaneous activity of other pathogens, e.g., PRRSV and Influenza, opening opportunities for *Mycoplasma hyopneumoniae* to flare up.

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

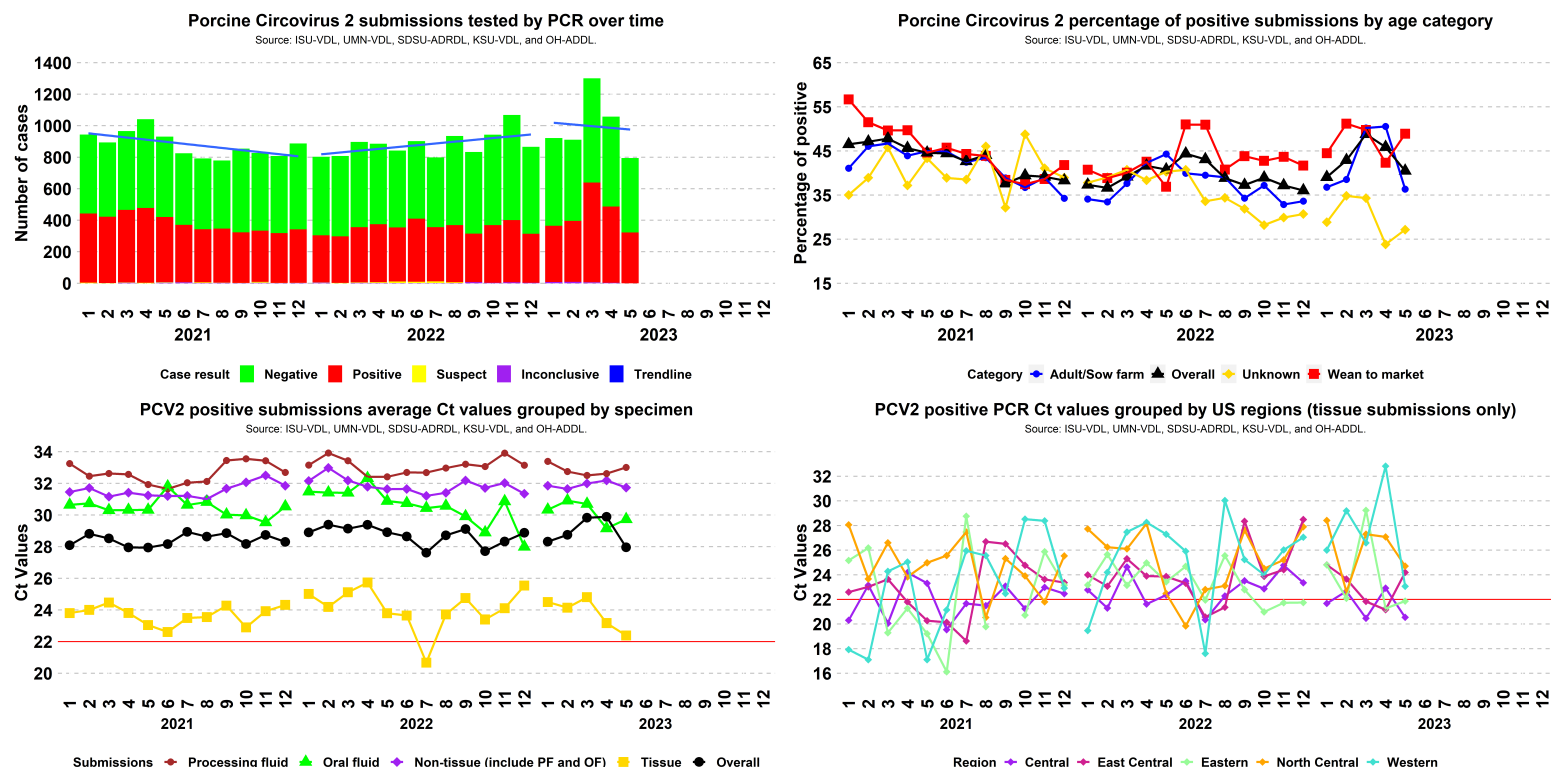


Figure 1. Top: Left: Results of PCV2 PCR cases over time; Right: PCV2 PCR-positive results, by category over time. Bottom Left: Average Ct values of PCV2 submissions by specimen; Right: Average Ct values of PCV2 tissue submissions by U.S. region; Central (IA), East Central (IL, IN, MO and WI), Eastern (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, 40.5% of 795 cases tested PCV2-positive in May, a substantial decrease from 45.88% of 1,055 in April;
 - Positivity in the adult/sow category in May was 36.34% (149 of 410), a marked decrease from 50.54% (326 of 645) in April;
 - Positivity in the wean-to-market category in May was 48.89% (154 of 315), a substantial increase from 42.33% (138 of 326) in April;
- In the month of May, the regions with the lowest PCV2 average Ct values was Central (48 submissions; average Ct 20.6), Eastern (22 submissions; average Ct 21.9), Western (10 submissions; average Ct 23.1), East Central (27 submissions; average Ct 24.2), and North Central (17 submissions; average Ct 24.7);
- The advisory group highlighted the importance of monitoring oral fluids and processing fluids submissions since they are the main population-based sample utilized for PCV2 monitoring programs. Significant drops in PCV2 PCR Ct values from processing fluid samples may represent sow farm instability for this pathogen, triggering more investigations from veterinarians to understand the PCV2 scenario in a herd.

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

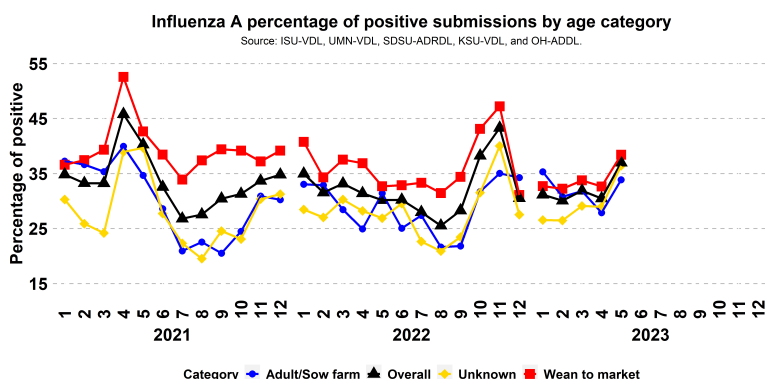
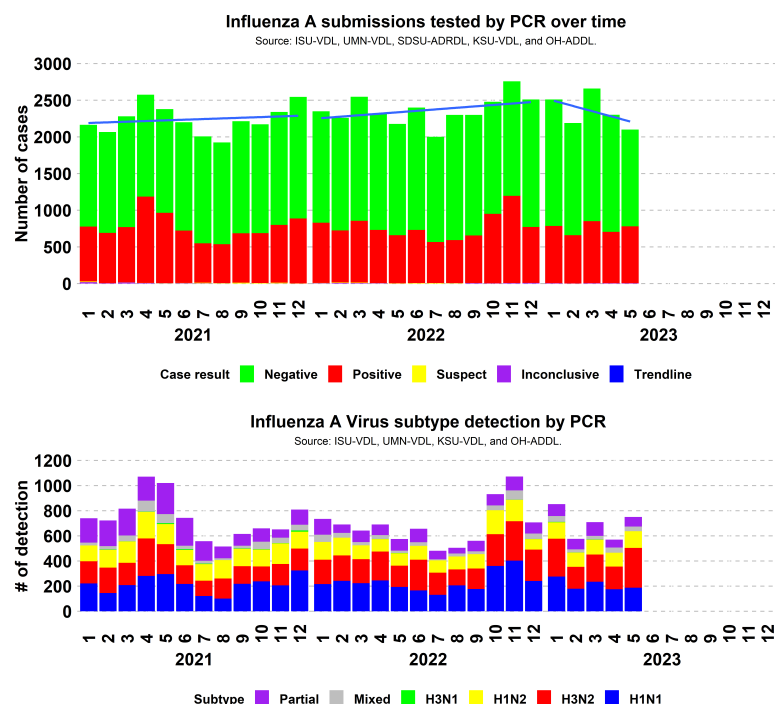


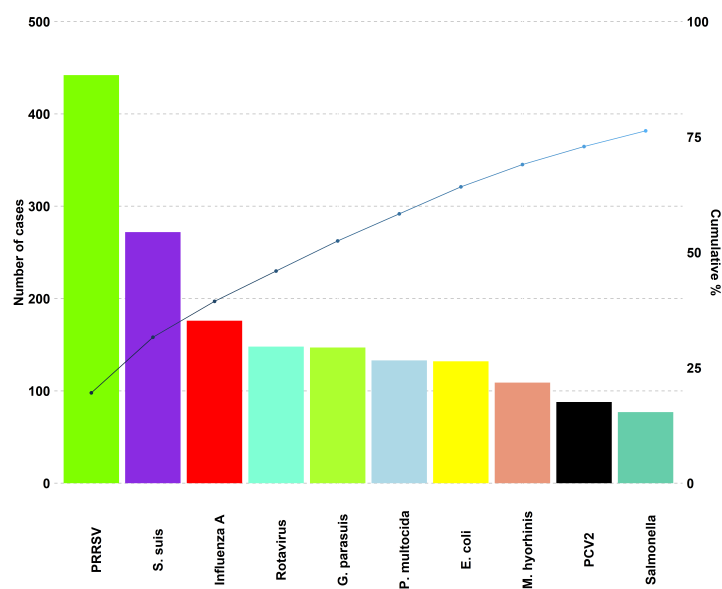
Figure 3. Top: *Left* Results of IAV PCR cases over time. *Right* Percentage of IAV PCR-positive results, by category over time. **Bottom:** Number of IAV subtyping PCR detection over time; (Partial - only hemagglutinin or neuraminidase region detected; Mixed - 3 or more haemagglutinin and neuroaminidase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

SDRS Advisory Group highlights:

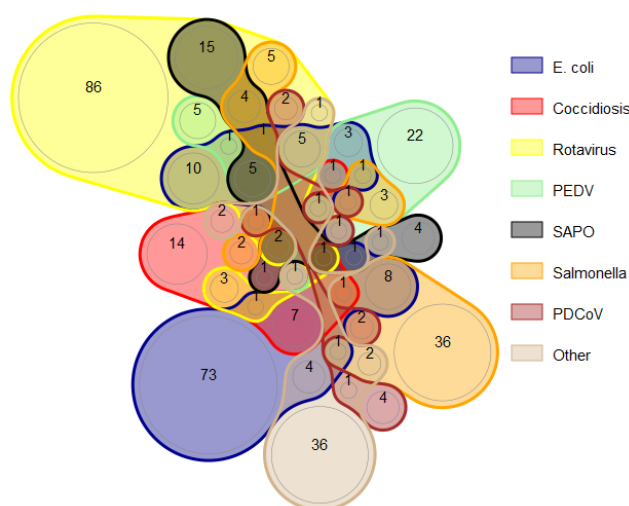
- Overall, 36.99% of 2,095 cases tested IAV-positive cases in May, a substantial increase from 30.47% of 2,297 in April;
 - Positivity in the adult/sow category in May was 33.87% (147 of 434), a substantial increase from 27.88% (116 of 416) in April;
 - Positivity in the wean-to-market category in May was 38.42% (408 of 1,062), a substantial increase from 32.65% (334 of 1,023) in April.
- Overall, 4.93% of 750 samples had mixed subtype detection in May, a moderate decrease from 7.19% of 570 in April;
- In 2023, the peak of increased detection of IAV occurred in late spring/beginning of summer, differently from the usual pattern detected by the SDRS database that occurs beginning/mid spring;
- The advisory group highlighted that PRRS herd closures contributed to keeping the percentage of positive submissions for Influenza A stable since many of these herds didn't introduce new animals, breaking the Influenza A cycle in sow farms and, subsequently, affecting positivity downstream. On the other side, increased genetic diversity of Influenza strains has been observed in the field and might be overcoming previous immunity status, generating new outbreaks, and contributing to the May Influenza A activity.

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

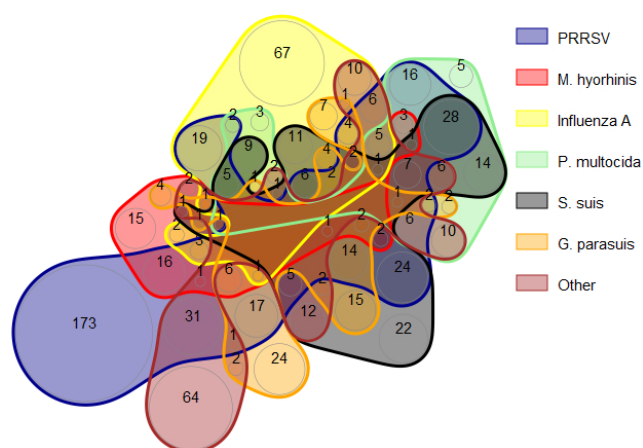
Overall diagnosis



Digestive



Respiratory



Nervous

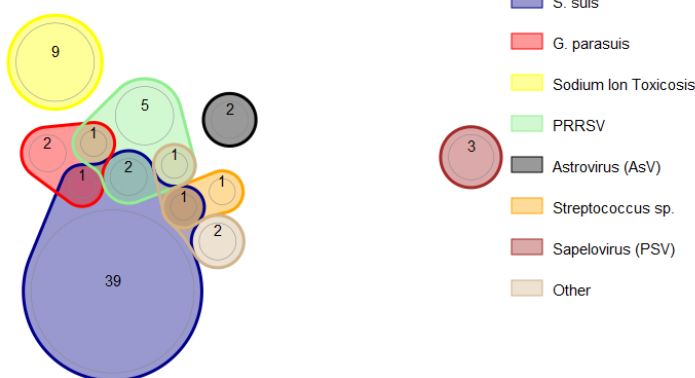


Figure 4. ISU-VDL most frequent overall confirmed tissue disease diagnosis. The presented system is described in the title of the chart. Colors represent one agent; line intersections present diagnosis of 2 or more agents within a submission. Only the most frequent etiology/disease are presented. Less 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 April. 1 to May. 24, 2023.

SDRS Advisory Group highlights:

- PRRSV (442) led cases with confirmed etiology, followed by *S. suis* (272), and Influenza A (176). PRRSV (413 of 1287) led the number of confirmed respiratory diagnoses, Rotavirus (148 of 523) lead the number of confirmed digestive diagnoses, and *S. suis* (43 of 75) led the number of confirmed neurological diagnoses.
- Even though was a small number of cases, between the weeks of April 17th and May 15th, there were spikes in the number of *Trueperella pyogenes* and coccidiosis 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.

Information for aggregated Ct value from Porcine Circovirus Type 2 (PCV2) submissions is now available on the monthly PDF reports

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The Swine Disease Reporting System (SDRS) aims 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. In the response to the request from our stakeholders, the SDRS brings onboard information for Porcine Circovirus type 2 (PCV2) PCR positive by Ct values. Two PCV2 charts summarizing average Ct values of PCR positive submissions by the specimen (chart 1) and US region (chart 2) are included in the monthly.

Using a subset of data that provides cases with a confirmed tissue diagnosis, i.e., diagnostic codes assigned, average Ct values of confirmed tissue diagnosis were compared with the remaining submissions without a diagnostic code assigned. Based on statistical assessment, cases with an average Ct value of 22 had an 80% chance of PCV2 disease diagnosis. Therefore, when the monthly average Ct trends down toward the threshold (redline, chart 1), it represents a high risk of PCV2 cases with associated lesions.

The two charts contribute to a better understanding of the PCV2 pattern of detection in the U.S., aiding the industry to comprehend if the trend of positive cases is associated with more changes in clinical expression.

Chart 1 demonstrates the submissions broken down by specimen: processing fluid (brown), oral fluid (green), submissions without tissue samples (purple), tissue submissions (at least one tissue submitted) (yellow), and overall submissions (black). The line with non-tissue cases includes the processing fluid and oral fluid submissions.

Chart 1. Average Ct values of PCV2 monthly submissions by specimen.

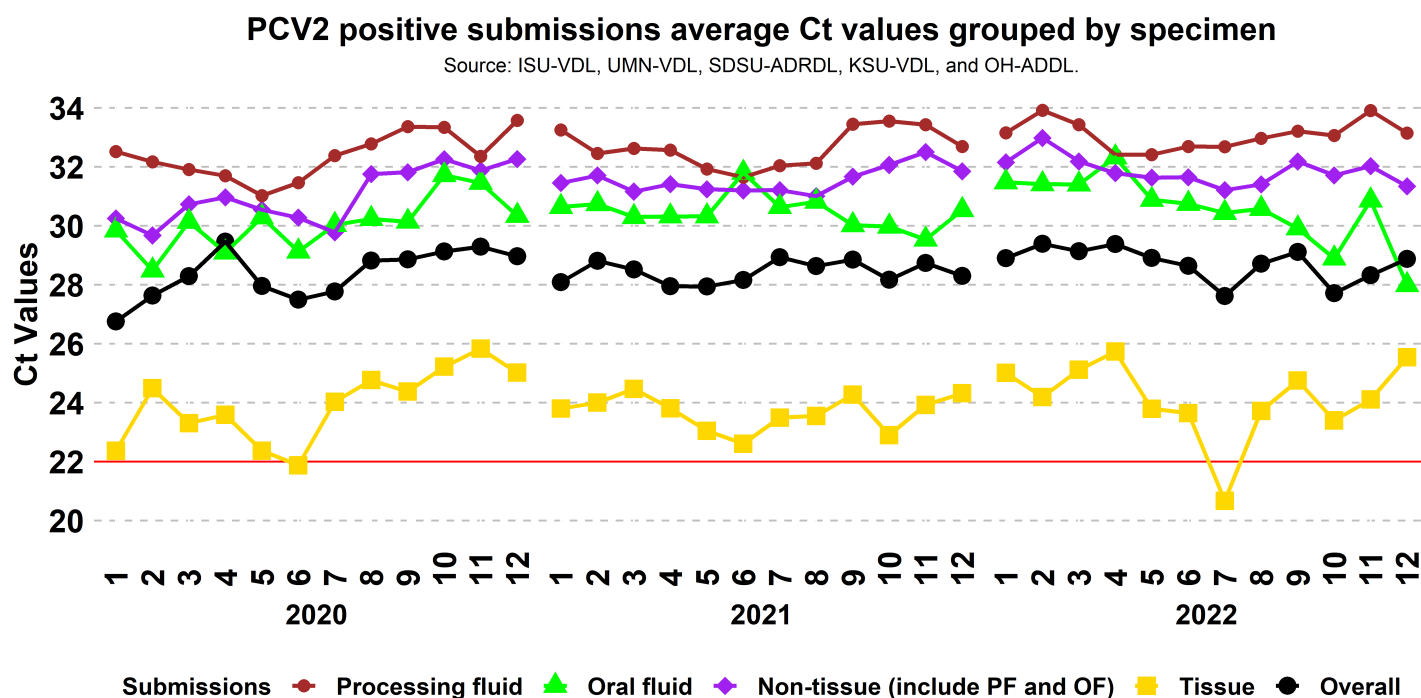


Chart 2 demonstrates the submission's average Ct values aggregated by U.S. regions. In this chart, all the submissions with at least one tissue sample were aggregated by the U.S. regions. Regions were decided based on pig inventory and the number of submissions from each region. Figure 1 shows the defined regions in a colorful map format. The yellow line from chart 1 is broken down in chart 2 by the regions to facilitate identifying regional changes in the detection pattern.

Chart 2. Average Ct values of PCV 2 monthly submissions that has at least one tissue sample by U.S. regions.

PCV2 positive PCR Ct values grouped by US regions (tissue submissions only)

Source: ISU-VDL, UMN-VDL, SDSU-ADRD, KSU-VDL, and OH-ADDL.

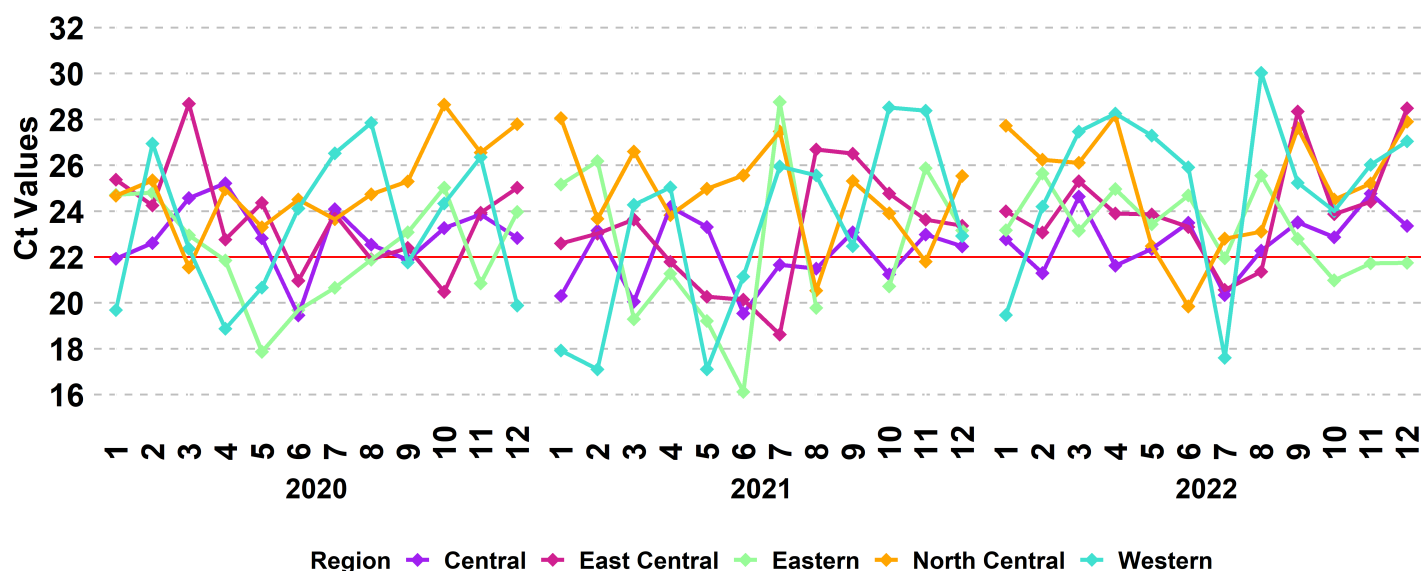


Figure 1. United States regions divided for the PCV2 submission aggregation based on number of pig inventory and submissions.

