Swine Disease Reporting System
Report # 75 (May 07, 2024)

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 VDL, Ohio Animal Disease and Diagnostic Laboratory (ADDL), and Purdue ADDL.

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, Hemant Naikare.

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. and *The Ohio State University*: Melanie Prarat, Ashley Johnson, Dennis Summers, Andréia Arruda.

Purdue University and *Indiana State BOAH*: Craig Bowen, Kenitra Hendrix, Joseph Boyle, Kelli Werling.

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/Lineage report and BLAST tool: Benchmark PRRSV ORF5 sequences and compare your PRRSV sequence with what have been detected in the U.S.

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: Providing their comments and perspectives monthly: Mark Schwartz, Megan Niederwerder, Paul Yeske, Deborah Murray, Brigitte Mason, Peter Schneider, Sam Copeland, Luc Dufresne, Daniel Boykin, Corrine Fruge, William Hollis, Rebecca Robbins, Thomas Petznick, Kurt Kuecker, and Lauren Glowzenski.

In addition to this report, interactive dashboards and educational material are publicly available.

Note: This report contains data up to April 30, 2024.

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

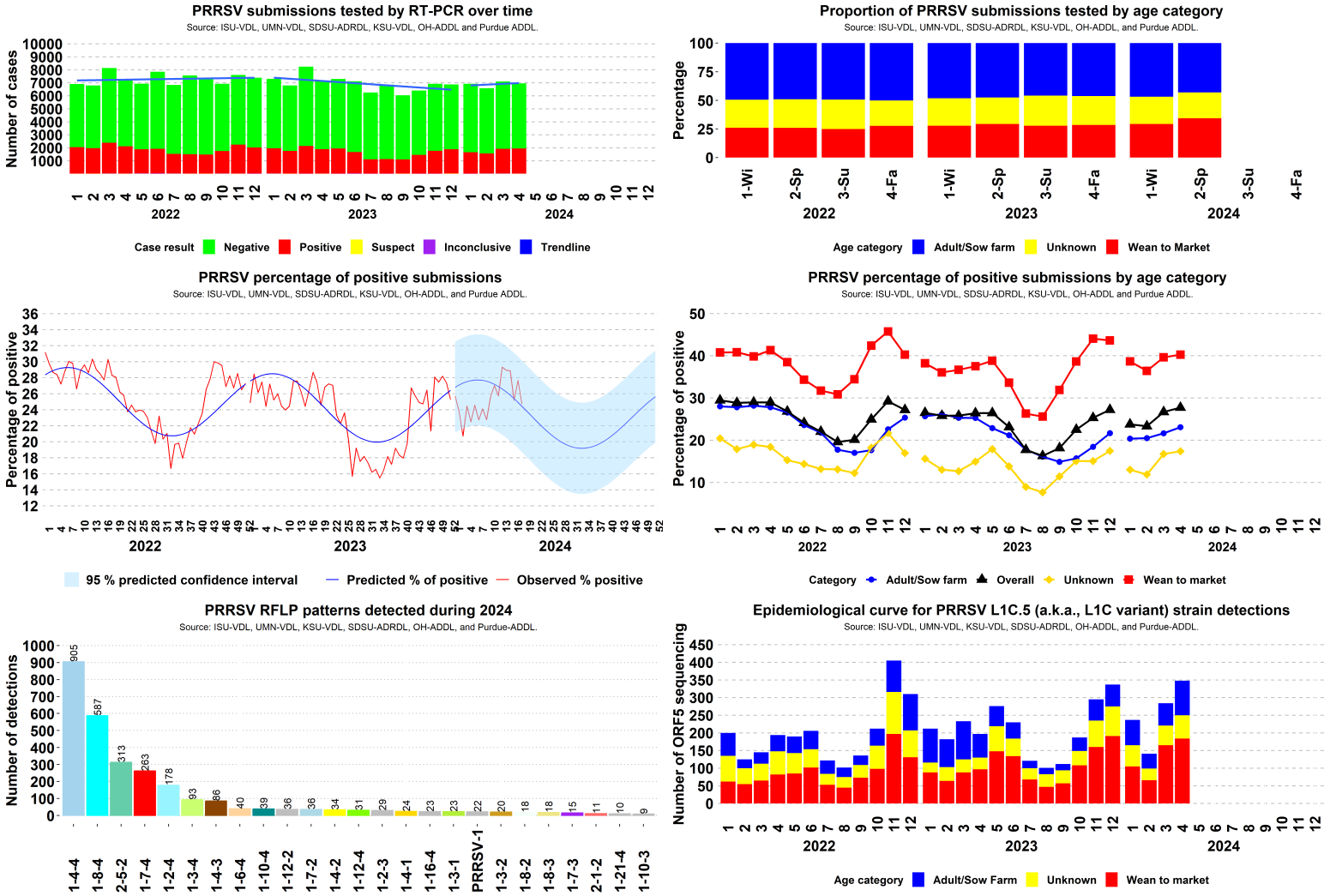


Figure 1. Top: *Left*: Results of PRRSV RT-PCR cases over time; *Right*: Proportion of accession ID cases tested for PRRSV by age group per year and season. **Middle**: *Left* Expected percentage of positive results for PRRSV RNA by RT-qPCR, with 95% confidence interval band for predicted results based 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 2024; *Right*: Epidemiological curve of detection for PRRSV Lineage 1C variant (L1C.5) strain.

SDRS Advisory Group highlights:

- Overall, 27.72% of 6,959 cases tested PRRSV-positive in April, similar to 26.68% of 7,109 in March;
  - Positivity in the adult/sow category in April was 23.09% (692 of 2,997), similar to 21.65% (663 of 3,063) in March;
  - Positivity in the wean-to-market category in April was 40.26% (965 of 2,397), similar to 39.62% (964 of 2,433) in March;
- Overall PRRSV-percentage of positive cases was 3 standard deviations above state-specific baselines in IA, SD, IN, and IL;
- During April 2024, PRRSV L1C.5 (variant) strains were detected in IA (196), MN (59), MO (39), NE (20), SD (8), IN (7), and IL (6).
- In April, a record of PRRSV ORF5 sequences classified as L1C.5 (variant) was detected. Since its emergence, this lineage has never had this amount of detection, except in November of 2022 (405). 190 sequences came from wean-to-market, 99 sequences from adult/sow farms and 66 from unknown sites.

Topic 2 – Enteric coronavirus RNA detection by RT-qPCR

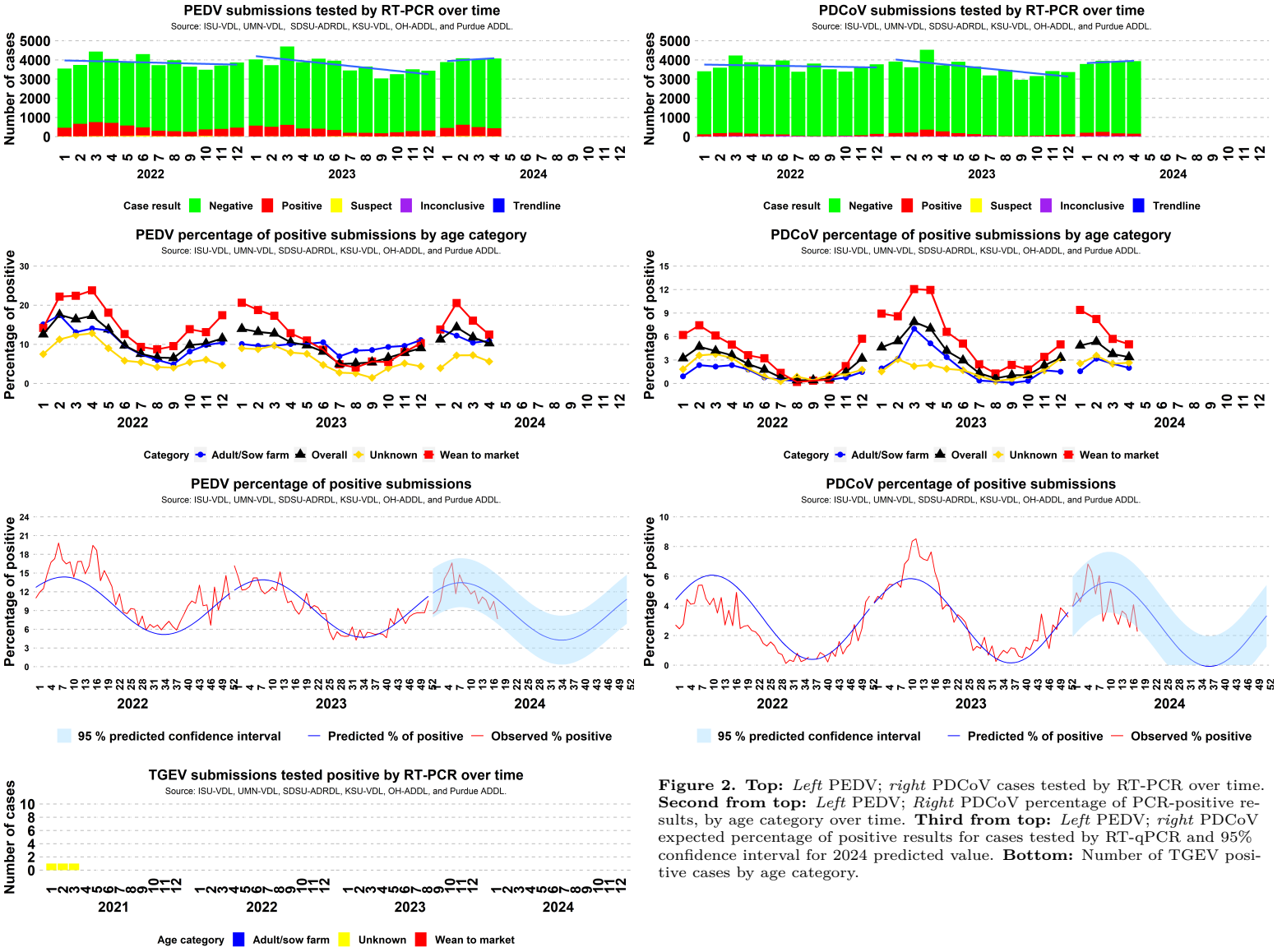
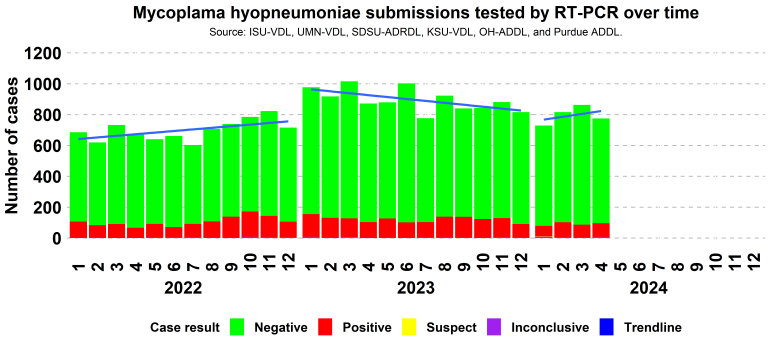


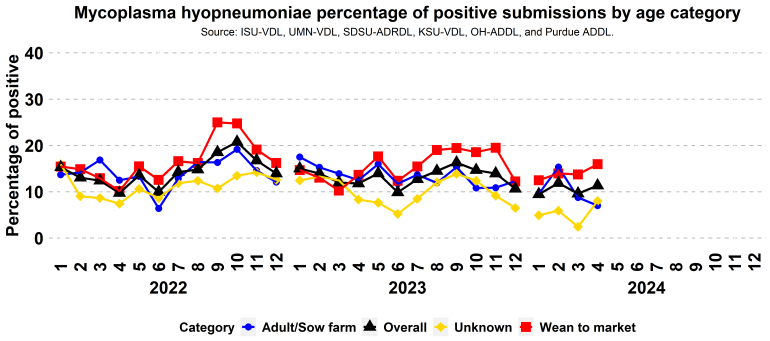
Figure 2. Top: *Left* PEDV; *right* PDCoV cases tested by RT-PCR over time. **Second from top:** *Left* PEDV; *Right* PDCoV percentage of PCR-positive results, by age category over time. **Third from top:** *Left* PEDV; *right* PDCoV expected percentage of positive results for cases tested by RT-qPCR and 95% confidence interval for 2024 predicted value. **Bottom:** Number of TGEV positive cases by age category.

SDRS Advisory Group highlights:

- Overall, 10.28% of 4,077 cases tested PEDV-positive in April, similar to 11.79% of 4,012 in March;
  - Positivity in the adult/sow category in April was 10.92% (161 of 1,474), similar to 10.43% (152 of 1,458) in March;
  - Positivity in the wean-to-market category in April was 12.49% (203 of 1,625), a moderate decrease from 16.06% (248 of 1,544) in March;
- Overall PEDV-percentage of positive cases was 3 standard deviations above state-specific baselines in KS and OH;
- Overall, 3.38% of 3,936 cases tested PDCoV-positive in April, similar to 3.77% of 3,902 in March;
  - Positivity in the adult/sow category in April was 2% (28 of 1,398), similar to 2.53% (35 of 1,385) in March;
  - Positivity in the wean-to-market category in April was 5.01% (80 of 1,597), similar to 5.69% (87 of 1,529) in March;
- Overall PDCoV-percentage of positive cases was 3 standard deviations above state-specific baselines in MN and MO;
- There was 0 positive case for TGEV RNA-PCR in April, 2024 over a total of 3,736 cases tested. It has been 38 months (with a total of 130,077 cases tested) since the last TGEV PCR-positive result;

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





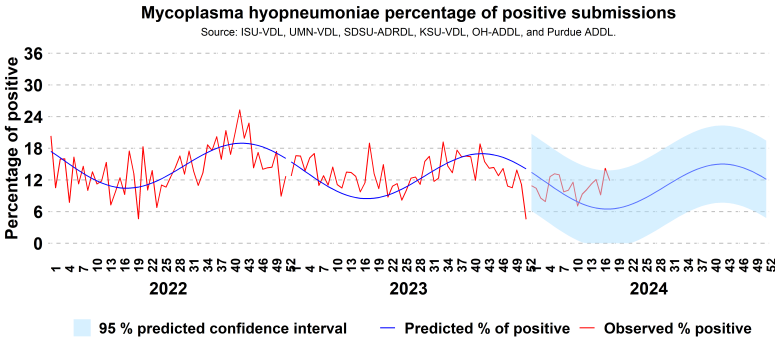


Figure 3. Top: *Left* MHP; MHP Case results tested by PCR over time. *Right* MHP PCR-positive results, by category over time. **Bottom:** expected percentage of positive results for MHP by PCR and 95% confidence interval for 2024 predicted value, based on weekly data observed in the previous 5 years.

SDRS Advisory Group highlights:

- Overall, 11.35% of 775 cases tested *M. hyopneumoniae*-positive cases in April, similar to 9.62% of 863 in March;
  - Positivity in the adult/sow category in April was 7.03% (18 of 256), similar to 8.76% (22 of 251) in March;
  - Positivity in the wean-to-market category in April was 15.97% (57 of 357), a moderate increase from 13.76% (56 of 407) in March;
- Overall MHP-percentage of positive cases was 3 standard deviations above state-specific baselines in SD;

Topic 4 – Detection of Porcine Circoviruses type 2 and 3 DNA by PCR.

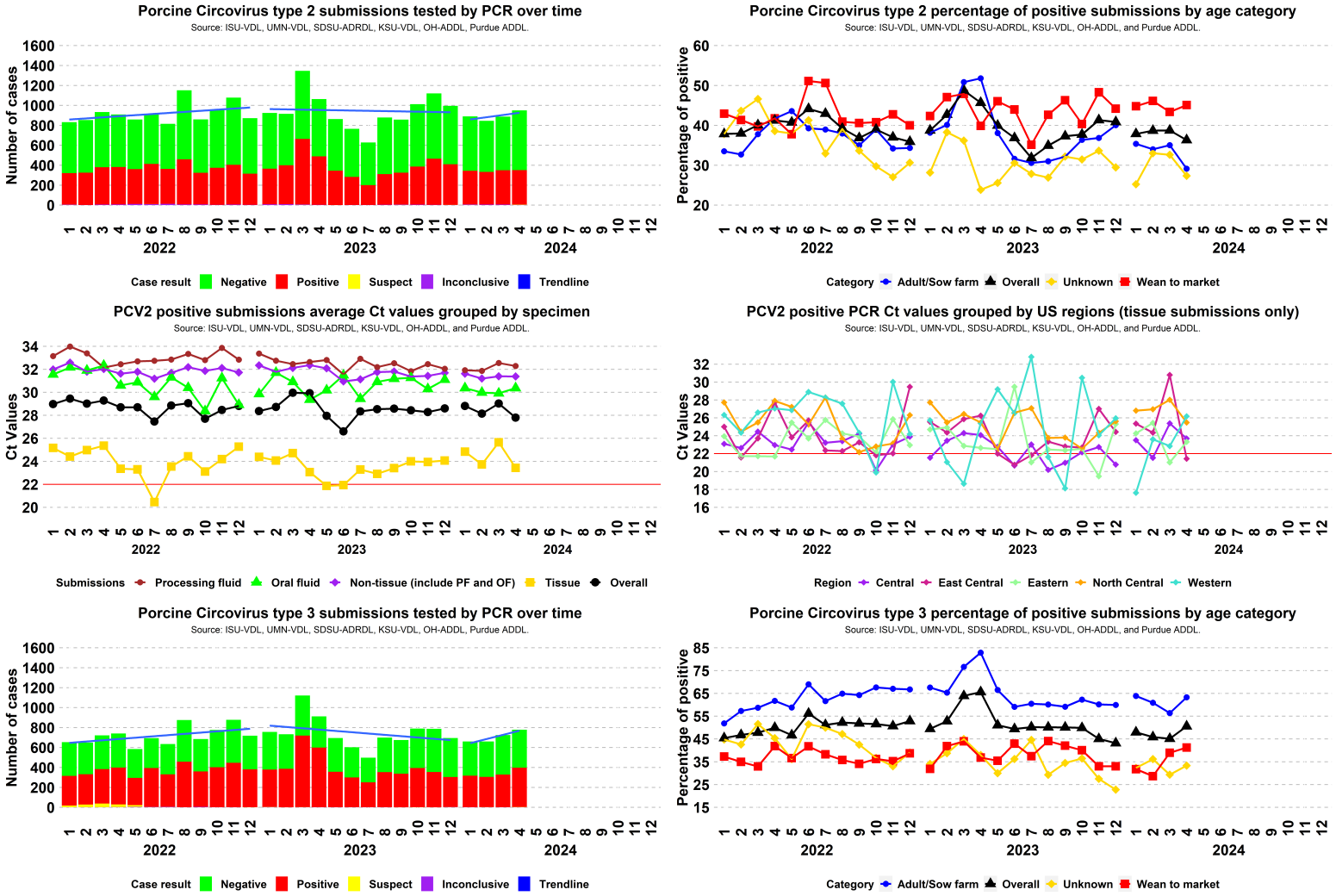


Figure 1. Top: *Left*: Results of PCV2 PCR cases over time; *Right*: PCV2 PCR-positive results, by category over time. **Middle**: *Left*: Average Ct values of PCV2 submissions by specimen; *Right*: Average Ct values of PCV2 tissue submissions by U.S. region; Central (IA), East Central (IL, IN, MO and 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). **Bottom** *Left*: Results of PCV3 PCR cases over time; *Right*: PCV3 PCR-positive results, by category over time.

SDRS Advisory Group highlights:

- Overall, 36.32% of 950 cases tested PCV2-positive in April, a moderate decrease from 38.74% of 888 in March;
  - Positivity in the adult/sow category in April was 29.14% (118 of 405), a substantial decrease from 35.04% (130 of 371) in March;
  - Positivity in the wean-to-market category in April was 45.1% (198 of 439), similar to 43.36% (183 of 422) in March;
- In the month of April, the regions with the lowest PCV2 average Ct values in tissue submissions was East Central (24 submissions; average Ct 21.4), Eastern (15 submissions; average Ct 23.3), Central (49 submissions; average Ct 23.7), North Central (33 submissions; average Ct 25.5), and Western (17 submissions; average Ct 26.2);
- Overall, 50.58% of 779 cases tested PCV3-positive in April, a substantial increase from 45.1% of 725 in March;
  - Positivity in the adult/sow category in April was 63.29% (231 of 365), a substantial increase from 56.35% (173 of 307) in March;
  - Positivity in the wean-to-market category in April was 41.27% (130 of 315), a moderate increase from 38.96% (127 of 326) in March.

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

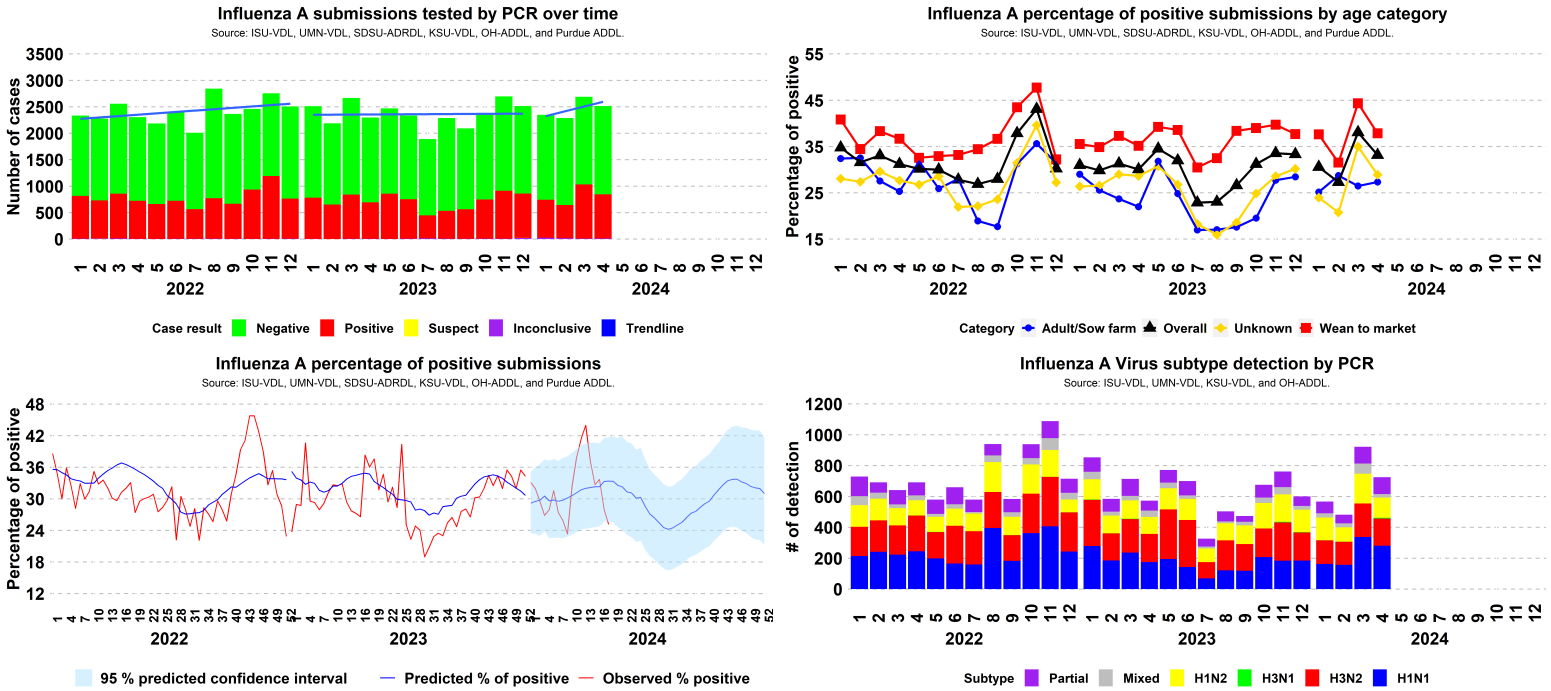


Figure 3. Top: *Left* Results of IAV PCR cases over time. *Right* Percentage of IAV PCR-positive results, by category over time. **Bottom:** *Left* expected percentage of positive results for IAV by PCR and 95% confidence interval for 2024 predicted value, based on weekly data observed in the previous 5 years. *Right* 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, 33.16% of 2,515 cases tested IAV-positive cases in April, similar to 38.07% of 2,690 in March;
  - Positivity in the adult/sow category in April was 27.35% (128 of 468), similar to 26.47% (135 of 510) in March;
  - Positivity in the wean-to-market category in April was 37.84% (484 of 1,279), a substantial decrease from 44.34% (599 of 1,351) in March.
- Overall IAV-percentage of positive cases was 3 standard deviations above state-specific baselines in MN;
- Overall, 3.17% of 725 samples had mixed subtype detection in April, a moderate decrease from 7.16% of 922 in March.

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

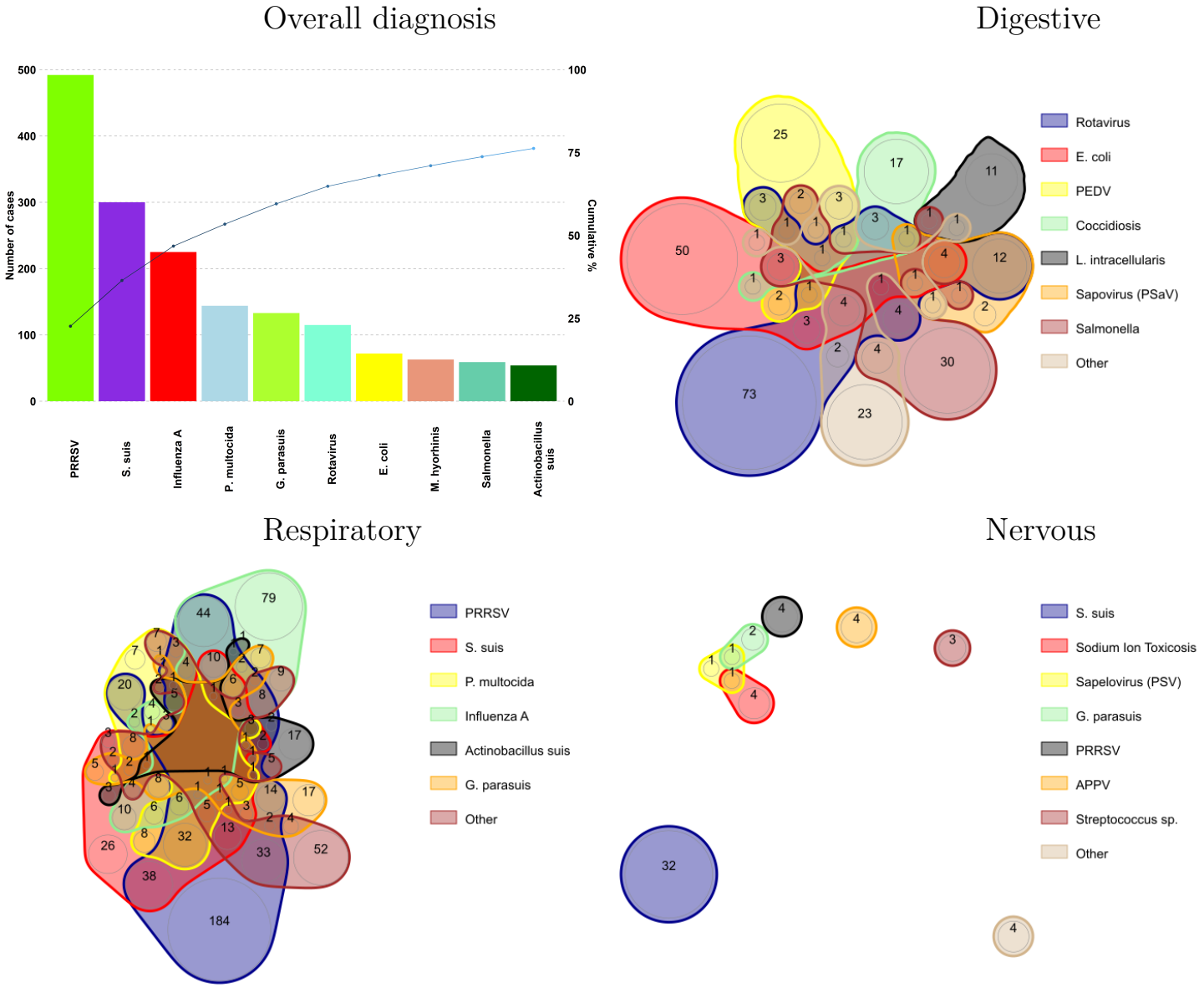


Figure 4. ISU-VDL most frequent overall confirmed tissue disease diagnosis. The presented system is described in the title of the chart. Colors represent one agent; line intersections present diagnosis of 2 or more agents within a submission. Only the most frequent etiology/disease are presented. Less 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, Magstadt, Mainenti, Michael, Piñeyro, Siepker, Madson, Thomas 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 March. 1 to April. 22, 2024.

SDRS Advisory Group highlights:

- PRRSV (492) led cases with confirmed etiology, followed by *S. suis* (300), and Influenza A (225). PRRSV (463 of 1385) led the number of confirmed respiratory diagnoses, Rotavirus (115 of 378) lead the number of confirmed digestive diagnoses, and *S. suis* (32 of 58) led the number of confirmed neurological diagnoses.
- There were consecutive alarms for the number of PRRSV confirmed diagnosis in the weeks of March 26th and April 4th of 2024.

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.*

Revamped SDRS online dashboards for analyte detection by PCR are now available

Jai Tatineni[1], Guilherme Cezar[1], Kinath Rupasinghe[1], Daniel Linhares[1], Giovani Trevisan[1],
1 - Swine Disease Reporting System office, Ames, Iowa, USA.

The Swine Disease Reporting System (SDRS) monitors endemic and emerging diseases affecting the swine population in the USA and shares information with stakeholders, assisting veterinarians and producers in making informed decisions on disease prevention, detection, and management. After a request from our stakeholders, the SDRS brings onboard the new PCR detection dashboard. The newly implemented dashboard provides the industry information about the trends of detection for the 8 pathogens monitored by the SDRS, with the capability for the audience to filter the information they need by analyte, over time, sample type, production phase, and state (region). Also a quality control feature for number of submissions with a farm type and state of sample collection information was added. The dashboard can be found on the SDRS website. There are features in the new dashboard that enable you to access several types of information described below:

Analyte over time: Provided information about the number of submissions tested by the pathogen of interest.

Specimen: This feature shows the number of submissions and proportion of specimens most tested for each pathogen by year.

Map: Provided the heat map information for number of submissions tested by analyte by state.

Age Category: This feature shows the number of submissions and its proportion by production phase, i.e., adult/sow farm, wean-to-market, and unknown.

Quality Control: In the quality control tab, the audience can check the percentage of submissions where information for site state and age category was provided in the submissions form and captured by the participant VDLs.

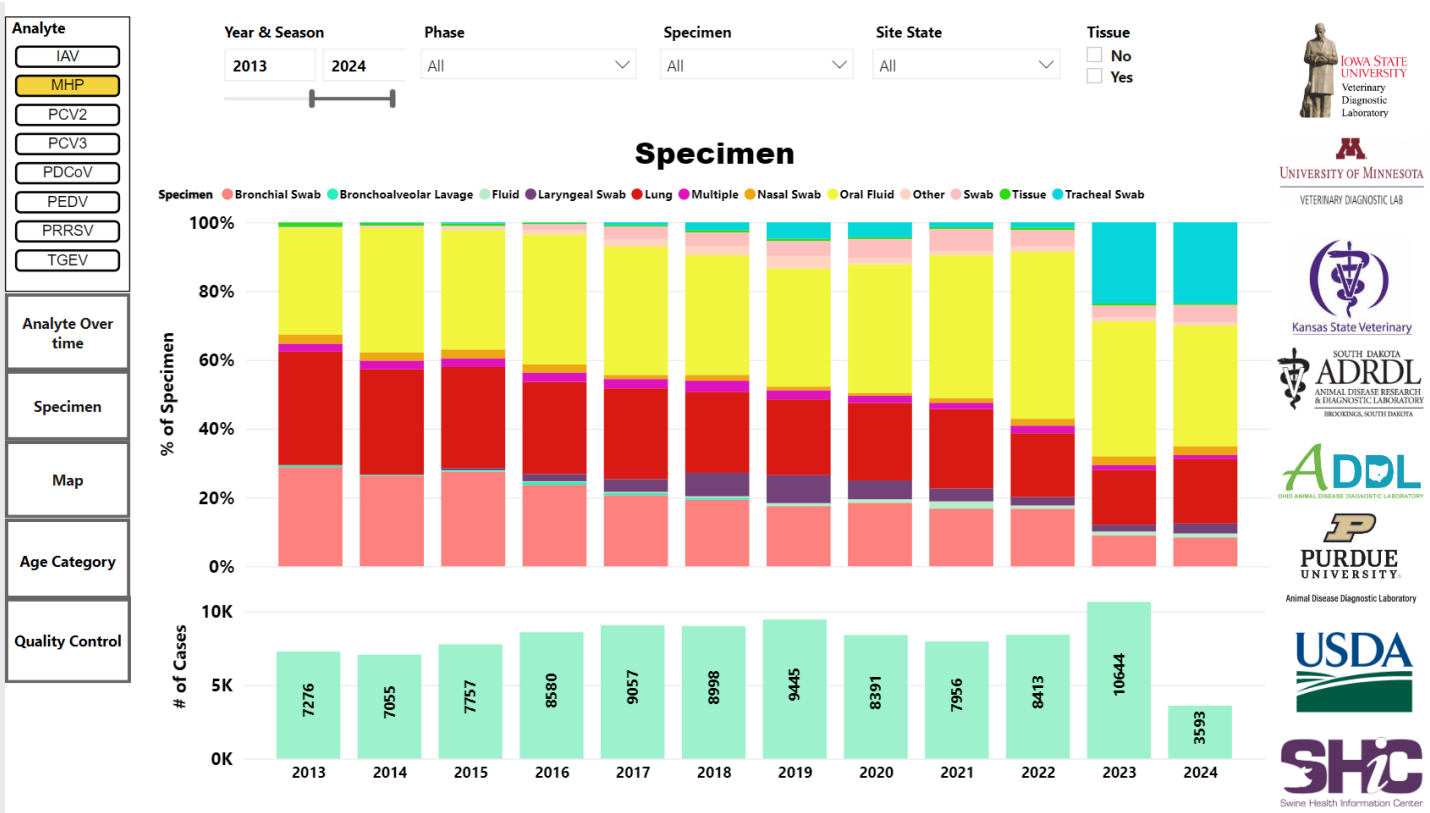


Figure 1: New SDRS PCR dashboard. Filters on the top left can change the pathogen display in the dashboard. Buttons on the left can change the information in the dashboard for detection over time (analyte over time), specimens detected per pathogen (specimen), number of analytes tested by states (map), cases splitted by age category (age category). Also, the filters on the top, can filter the information by year, phase, specimen, state, and tissues submissions.

Acknowledgement: project funded by USDA-NIFA (Tactical Sciences for Agricultural), award number 2023-67015-39883.