Swine Disease Reporting System
Report # 67 (September 5, 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, 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.

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.

Purdue University: Craig Bowen, Kenitra Hendrix, Joseph Boyle.

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 over time by specimen, age group, and US State.

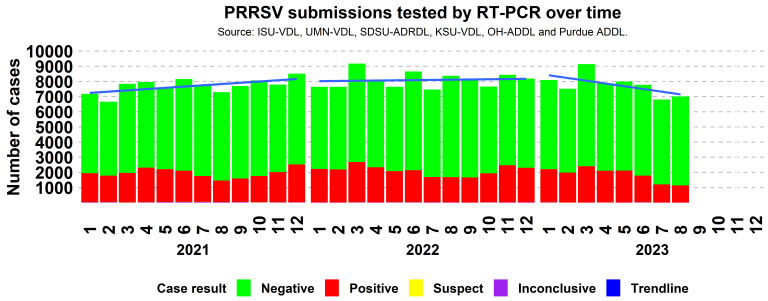
Audio and video reports: Key findings from SDRS projects are summarized monthly in a conversation between investigators and available in the form of an "audio report" and "video report" through Spotify, Apple Podcast, Google podcast, SwineCast, YouTube, LinkedIn, and the SDRS webpage.

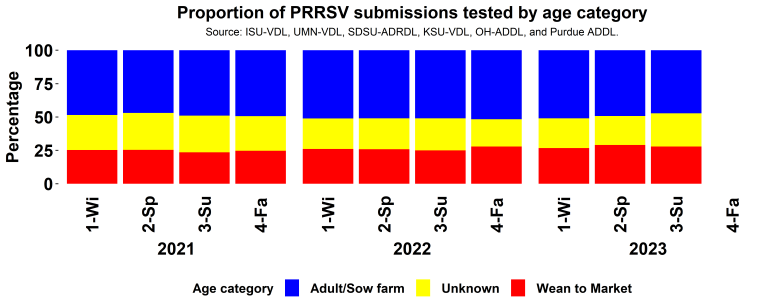
Advisory Group: Reviews and discusses the data, providing their comments and perspectives monthly: Mark Schwartz, Paul Sundberg, Paul Yeske, Deborah Murray, Brigitte Mason, Peter Schneider, Sam Copeland, Luc Dufresne, Daniel Boykin, Corrine Fruge, William Hollis, Rebecca Robbins, Thomas Petznick and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

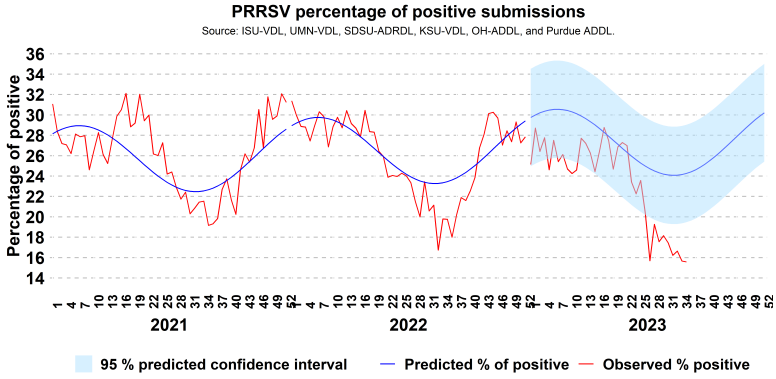
In addition to this report, interactive dashboards with aggregated test results are available at www.fieldepi.org/SDRS.

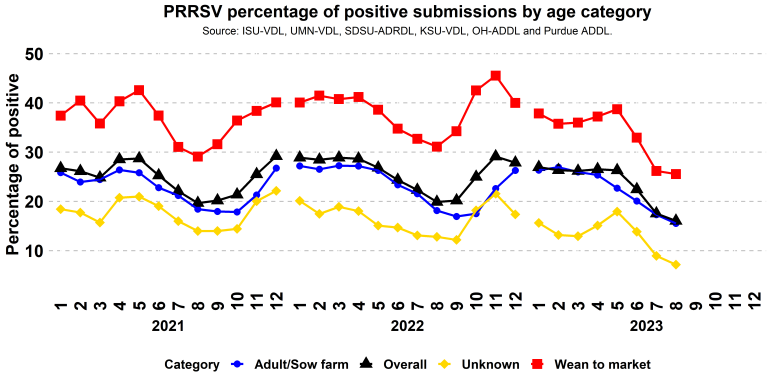
Note: This report contains data up to August 31, 2023.

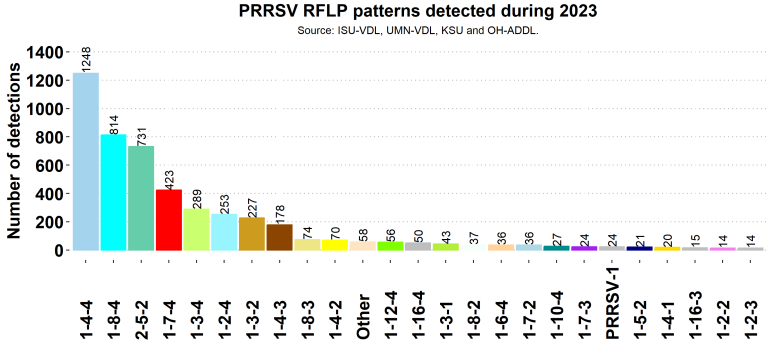
Topic 1 – Detection of PRRSV RNA over time by RT-qPCR.











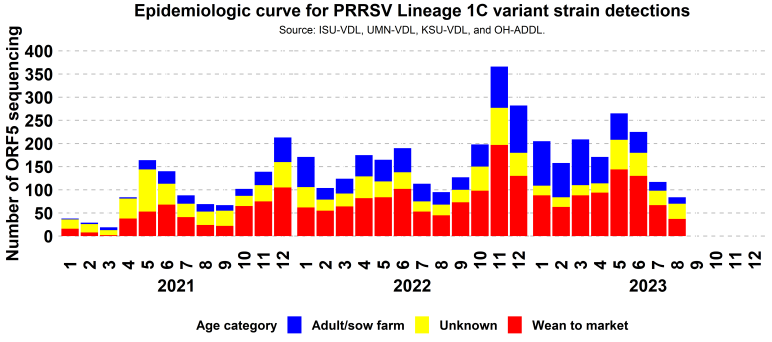


Figure 1. **Top**: *Left*: Results of PRRSV RT-PCR cases over time; *Right*: Proportion of accession ID cases tested for PRRSV by age group per year and season. **Middle**: *Left* Expected percentage of positive results for PRRSV RNA by RT-qPCR, with 95% confidence interval band for predicted results 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, 16.05% of 7,011 cases tested PRRSV-positive in August, similar to 17.55% of 6,808 in July;
  - Positivity in the adult/sow category in August was 15.54% (524 of 3,373), similar to 17.3% (558 of 3,226) in July;
  - Positivity in the wean-to-market category in August was 25.55% (473 of 1,851), similar to 26.18% (481 of 1,837) in July;
  - Overall PRRS-percentage of positive was 3 standard deviations from state-specific baselines in IL and OH;
- During August 2023, PRRSV L1C variant strains were detected in IA (40), MN (23), MO (15), NE (2), SD (2), and OH (1);
- Since 2003 PRRS virus achieved the historically lowest percentage of positive submissions in the Wean to Market category in July (25.51%) and August (26.06%). In Sow farms, the current percentage of positive submissions (16.28%) is the lowest since October 2017 (13.53%). The detection is also the lowest (16.56%) since October 2014 (6.13%) in the overall category (including all the phases and the unknown).

Topic 2 – Enteric coronavirus RNA detection by RT-qPCR

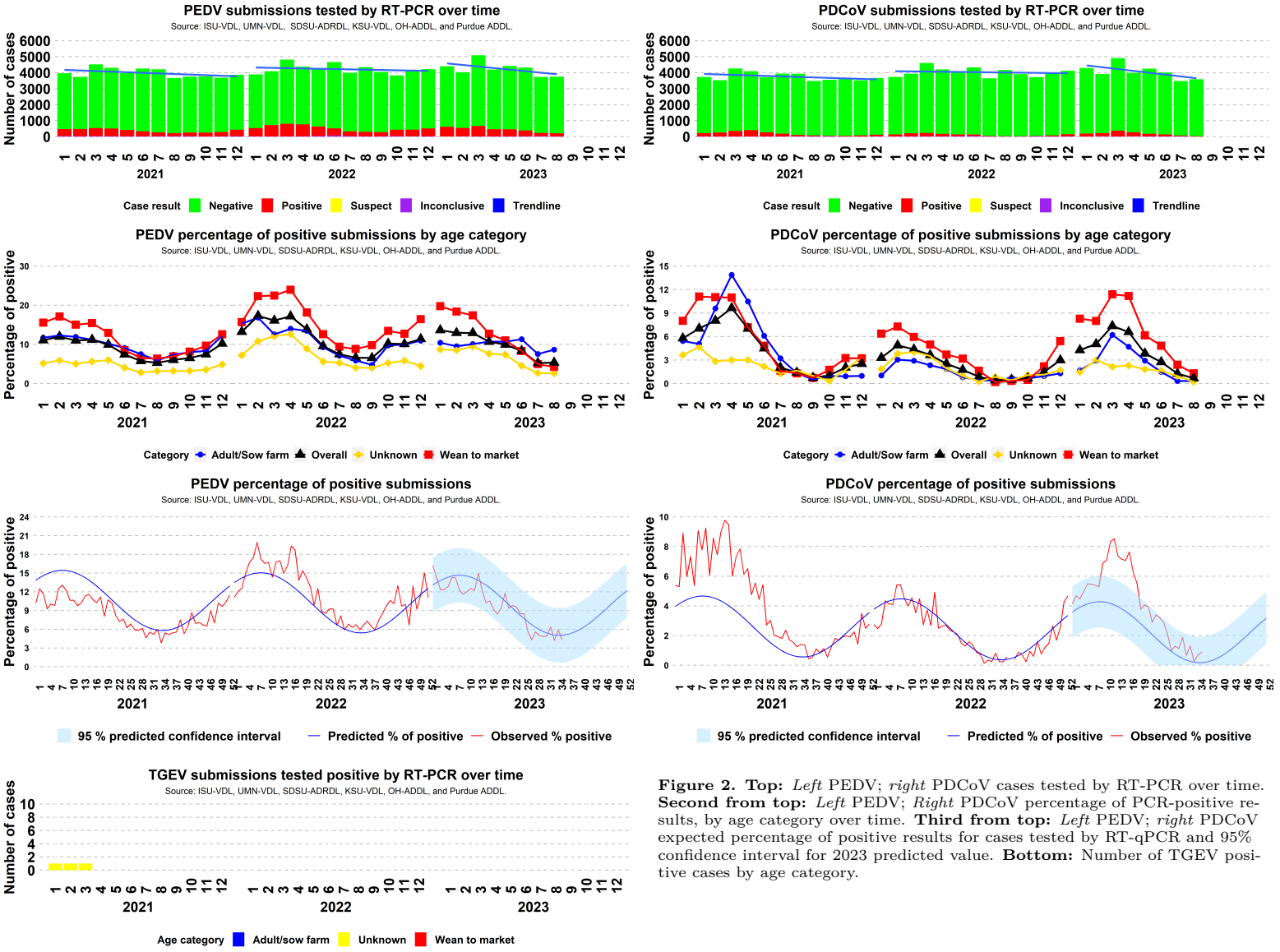


Figure 2. Top: *Left* PEDV; *right* PDCoV cases tested by RT-PCR over time. **Second from top:** *Left* PEDV; *Right* PDCoV percentage of PCR-positive results, by age category over time. **Third from top:** *Left* PEDV; *right* PDCoV expected percentage of positive results for cases tested by RT-qPCR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

SDRS Advisory Group highlights:

- Overall, 5.35% of 3,754 cases tested PEDV-positive in August, similar to 5.25% of 3,736 in July;
  - Positivity in the adult/sow category in August was 8.64% (114 of 1,320), similar to 7.53% (99 of 1,314) in July;
  - Positivity in the wean-to-market category in August was 4.24% (61 of 1,439), similar to 4.95% (70 of 1,415) in July;
  - Overall PEDV-percentage of positive cases was 3 standard deviations from state-specific baselines in MO and NC;
- Overall, 0.67% of 3,587 cases tested PDCoV-positive in August, similar to 1.27% of 3,476 in July;
  - Positivity in the adult/sow category in August was 0.32% (4 of 1,262), similar to 0.32% (4 of 1,234) in July;
  - Positivity in the wean-to-market category in August was 1.31% (18 of 1,379), similar to 2.39% (31 of 1,296) in July;
  - Overall PDCoV-percentage of positive cases was 3 standard deviations from state-specific baselines in KS;
- There was 0 positive case for TGEV RNA-PCR in August, 2023 over a total of 3,497 cases tested. It has been 29 months (with a total of 111,090 cases tested) since the last TGEV PCR-positive result;
- Some small activity was detected for PEDV percentage of positive submissions from sow farms in August. This finding still doesn't give signals on our statistical monitoring charts, but it is atypical based on the expectations that PEDV activity should decrease at the end of summer.

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

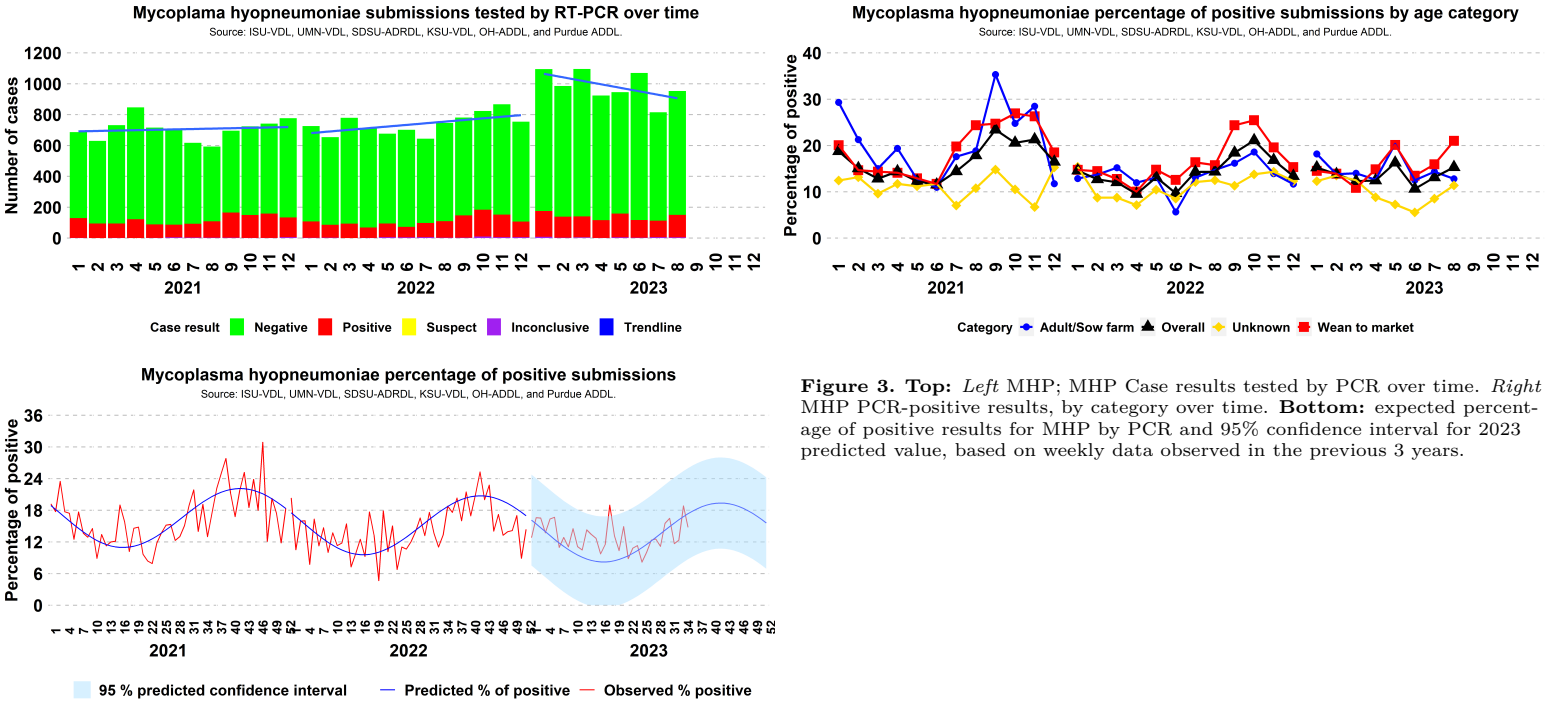


Figure 3. Top: *Left* MHP; MHP Case results tested by PCR over time. *Right* MHP PCR-positive results, by category over time. **Bottom:** expected percentage of positive results for MHP by PCR and 95% confidence interval for 2023 predicted value, based on weekly data observed in the previous 3 years.

SDRS Advisory Group highlights:

- Overall, 15.32% of 953 cases tested *M. hyopneumoniae*-positive cases in August, a moderate increase from 13.13% of 815 in July;
  - Positivity in the adult/sow category in August was 12.83% (44 of 343), similar to 14.33% (42 of 293) in July;
  - Positivity in the wean-to-market category in August was 21.01% (71 of 338), a substantial increase from 15.94% (44 of 276) in July;
- Overall MHP-percentage of positive was within state-specific baselines in all 11 monitored states.

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

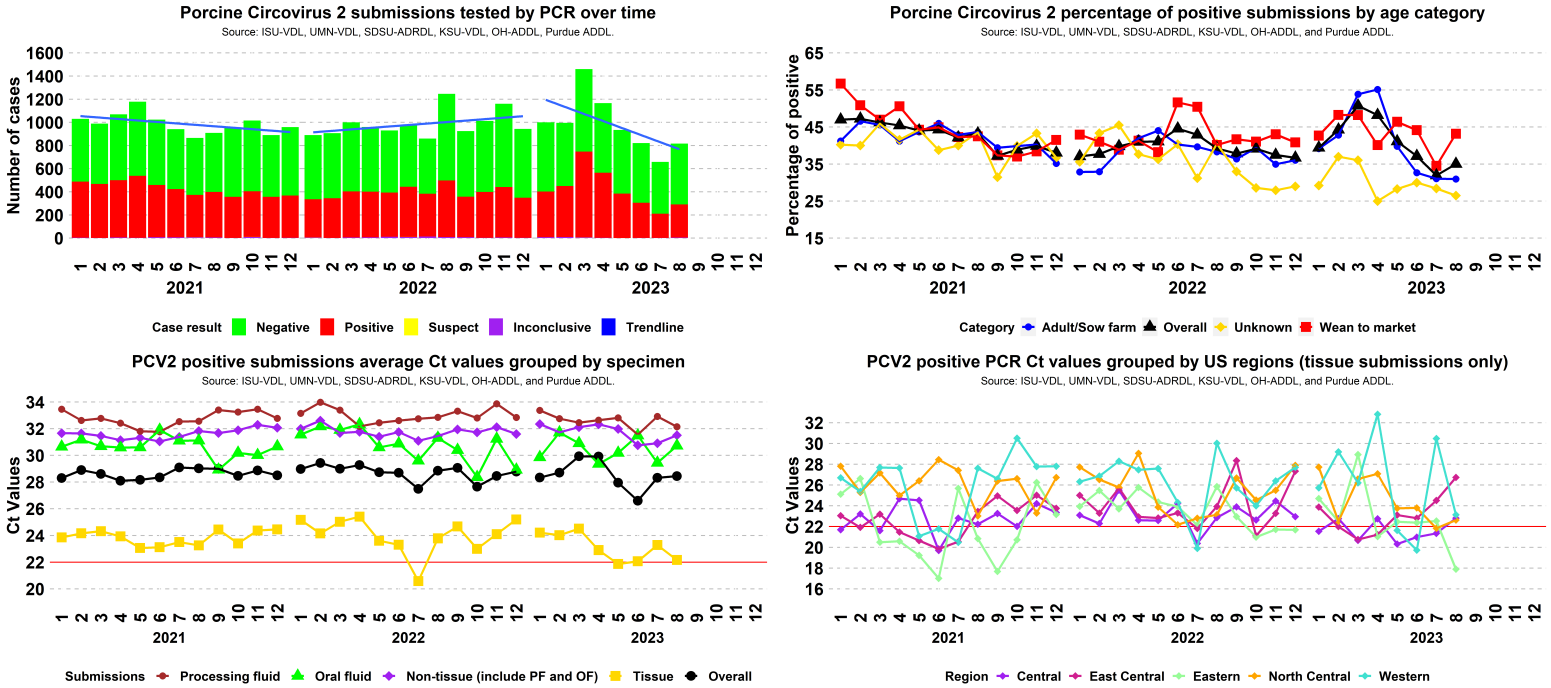
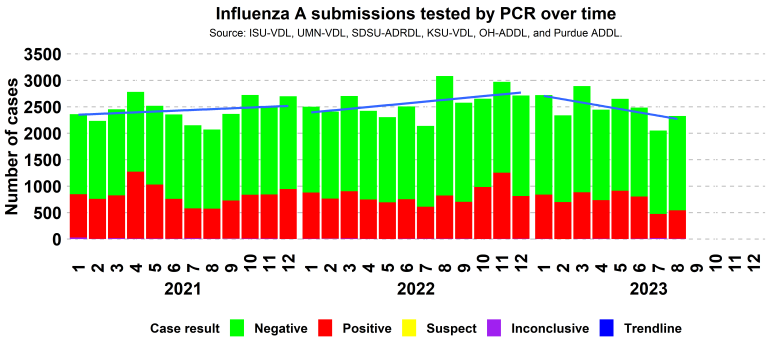


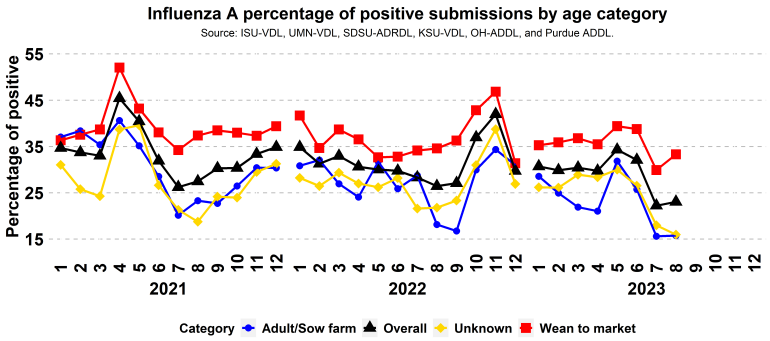
Figure 1. Top: *Left*: Results of PCV2 PCR cases over time; *Right*: PCV2 PCR-positive results, by category over time. **Bottom** *Left*: Average Ct values of PCV2 submissions by specimen; *Right*: Average Ct values of PCV2 tissue submissions by U.S. region; Central (IA), East Central (IL, IN, MO and 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, 35.01% of 817 cases tested PCV2-positive in August, a moderate increase from 31.91% of 658 in July;
  - Positivity in the adult/sow category in August was 30.95% (134 of 433), similar to 31.05% (109 of 351) in July;
  - Positivity in the wean-to-market category in August was 43.19% (130 of 301), a substantial increase from 34.51% (78 of 226) in July;
- In the month of August, the regions with the lowest PCV2 average Ct values was Eastern (19 submissions; average Ct 17.9), North Central (12 submissions; average Ct 22.6), Central (26 submissions; average Ct 22.8), Western (16 submissions; average Ct 23.1), and East Central (9 submissions; average Ct 26.7);

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





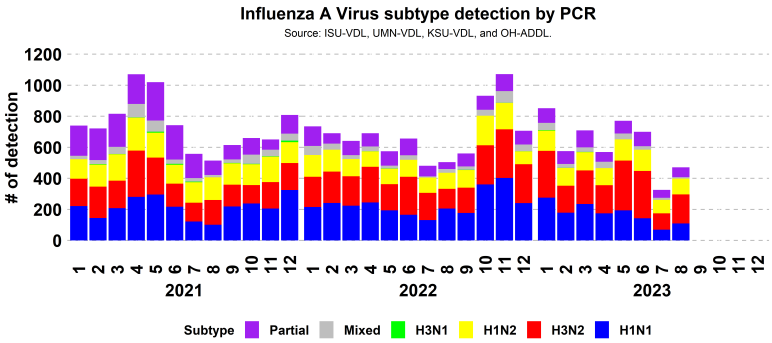


Figure 3. Top: *Left* Results of IAV PCR cases over time. *Right* Percentage of IAV PCR-positive results, by category over time. **Bottom:** Number of IAV subtyping PCR detection over time; (Partial - only hemagglutinin or neuraminidase region detected; Mixed - 3 or more haemagglutinin and neuroamnidase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

SDRS Advisory Group highlights:

- Overall, 23.04% of 2,326 cases tested IAV-positive cases in August, similar to 22.23% of 2,051 in July;
  - Positivity in the adult/sow category in August was 15.76% (87 of 552), similar to 15.63% (73 of 467) in July;
  - Positivity in the wean-to-market category in August was 33.3% (318 of 955), a moderate increase from 29.93% (246 of 822) in July.
- Overall, 1.91% of 471 samples had mixed subtype detection in August, a moderate decrease from 3.99% of 326 in July;

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

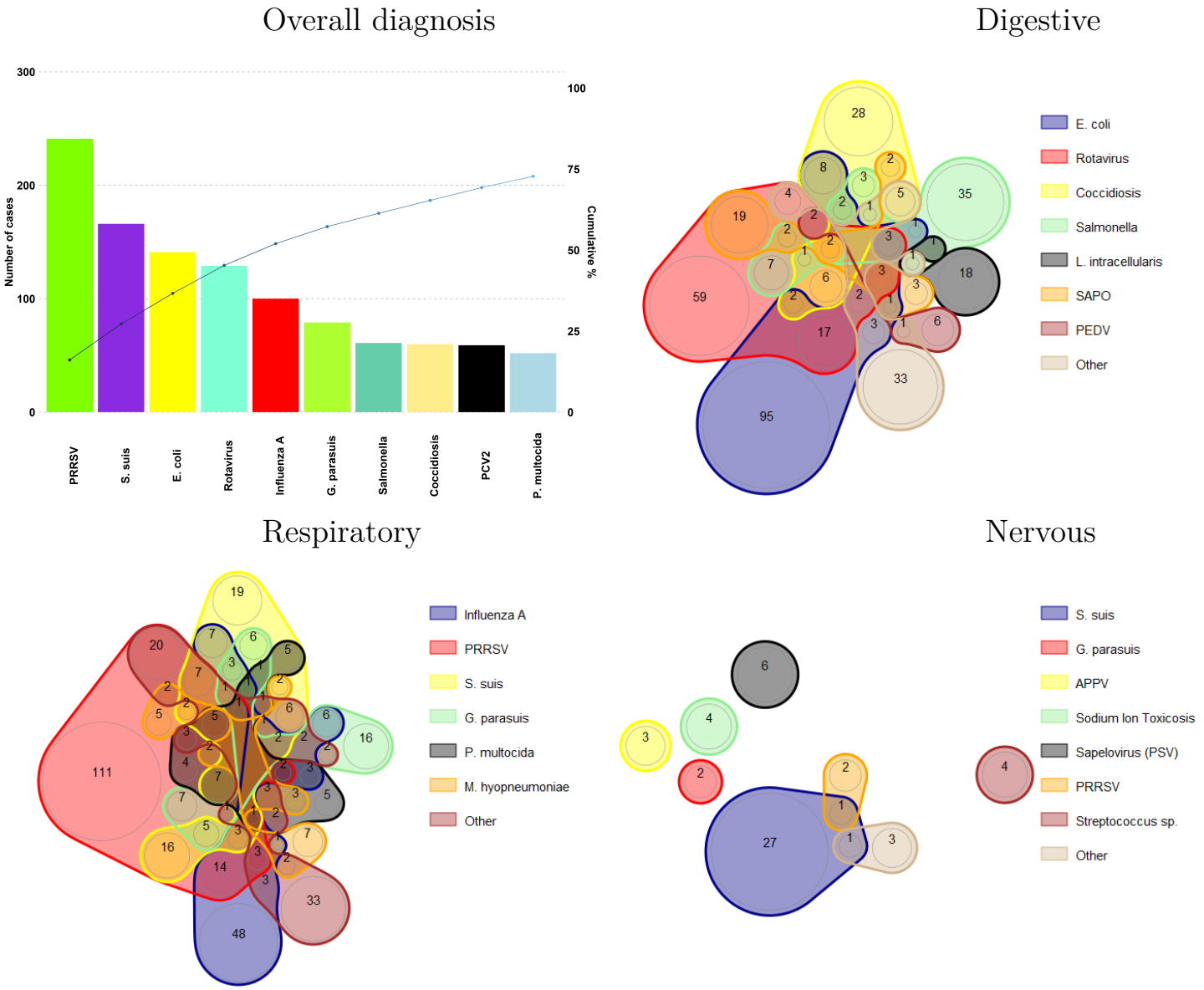


Figure 4. ISU-VDL most frequent overall confirmed tissue disease diagnosis. The presented system is described in the title of the chart. Colors represent one agent; line intersections present diagnosis of 2 or more agents within a submission. Only the most frequent etiology/disease are presented. Less 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 July. 1 to August. 21, 2023.

SDRS Advisory Group highlights:

- PRRSV (241) led cases with confirmed etiology, followed by *S. suis* (166), and *E. coli* (141). PRRSV (222 of 667) led the number of confirmed respiratory diagnoses, *E. coli* (137 of 495) lead the number of confirmed digestive diagnoses, and *S. suis* (29 of 55) led the number of confirmed neurological diagnoses.
- Even though there was a small number of cases, between the weeks of July 31st and August 8th, there were spikes in the number of 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.*

Purdue Animal Disease Diagnostic Laboratory joins the Swine Disease Reporting System network

Craig Bowen[1], Kenitra Hendrix[1], Joseph Boyle[1]

1 - Purdue University, West Lafayette, Indiana, USA.

The Animal Disease Diagnostic Laboratory (ADDL) opened as an official stand-alone facility in 1947 on Purdue University's West Lafayette, Indiana campus, but its origin actually dates back to 1912 when its initial operations began as a testing laboratory for vaccines to prevent and control hog cholera. As such, the laboratory was one of the first resources in the United States dedicated exclusively to the diagnosis of animal diseases. In 1969, a second location was established in Southern Indiana to provide crucial testing and support to the poultry industry as well as to aid in the general prevention, control, and eradication of animal diseases and to provide for the safety of the food supply.With state-of-the-art equipment in the hands of highly trained and dedicated staff, the ADDL provides reliable veterinary diagnostic testing to Indiana and the rest of the United States. The laboratory accessioned a total of 29,478 animal cases in 2022, with nearly 66 percent of those originating in Indiana, and 34 percent coming from out of state. Indiana ranks fifth in the United States for pork production, and animal agriculture contributes more than $4 billion each year to Indiana's economy. Indiana pork producers annually meet the pork needs of every man, woman, and child in Indiana. . . plus 15 million more people in the U.S. and 5 million more people around the world.

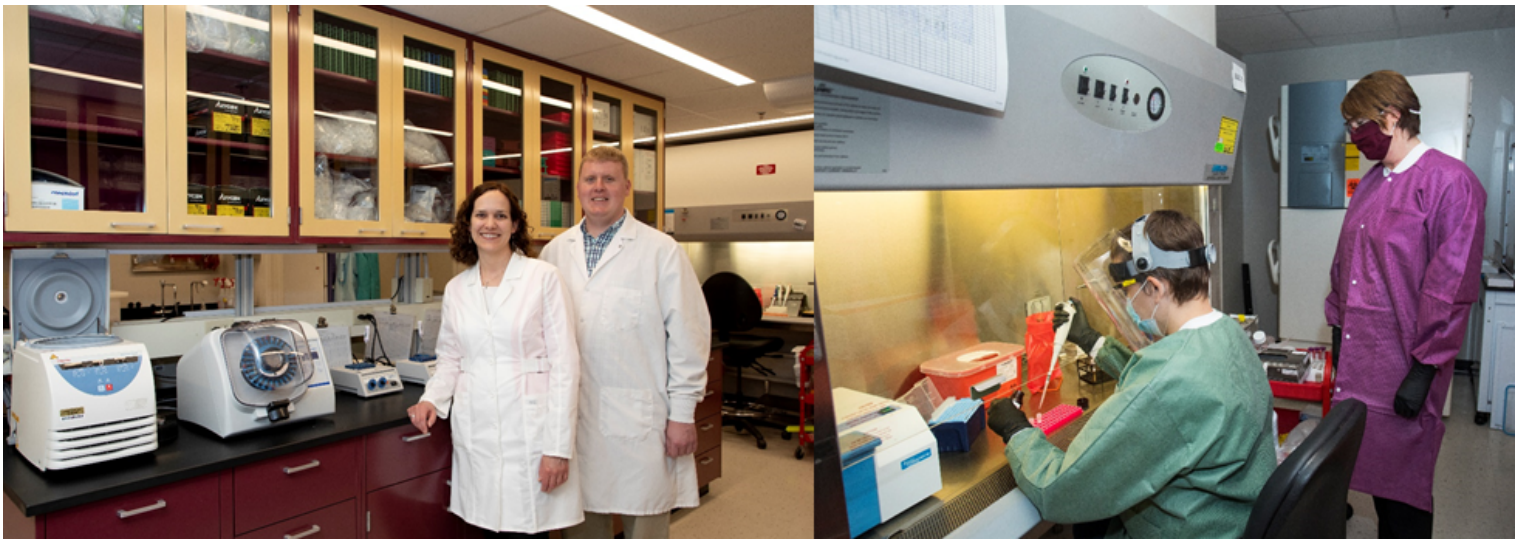


Figure 1: **left:** Dr. Kenitra Hendrix, ADDL director and clinical associate professor of veterinary diagnostic microbiology, with Dr. Craig Bowen, ADDL assistant director and department head of accessioning. **right:** Dr. Rebecca Wilkes (standing), molecular diagnostics section head Staff members at the Heeke Animal Disease Diagnostic Laboratory.

The ADDL and the Heeke Laboratory focus on helping Indiana veterinarians, animal health officials, livestock producers, and animal owners protect the health of the animal population by providing prompt, accurate, and reliable diagnoses of animal diseases, including those that may also affect the human population. The ADDL is fully accredited by the American Association of Veterinary Laboratory Diagnosticians (AAVLD) and serves as the official diagnostic laboratory for the State of Indiana. The ADDL offers a wide range of testing services in the specialty areas of aquaculture, avian, bacteriology and mycology, canine genetics, histology, immunohistochemistry, molecular diagnostics, pathology, parasitology, serology, toxicology, and virology. The ADDL is a Level 2 laboratory and a member of the USDA National Animal Health Laboratory Network (NAHLN) and the FDA Food Emergency Response Network (FERN). Additionally, the ADDL serves an important role in the College of Veterinary Medicine's educational programs, including the DVM And Veterinary Nursing degree programs, residencies and traditional graduate degree programs in anatomical pathology, poultry diagnostic medicine, and microbiology. The ADDL has a sizeable catalog of swine diagnostic tests that continues to grow and meet the diagnostic needs of the swine veterinarians and producers. In addition to traditional serologic and microbial diagnostic methods, the ADDL continues to expand the offering of molecular diagnostic services through individual PCR assays and syndromic panels.The ADDL at Purdue University is pleased to join the Swine Diseases Reporting System (SDRS) network and looks forward to collaborating with other SDRS members in providing data for use in disease prevention and biosecurity, and disease monitoring, management and forecasting.