Swine Disease Reporting System
Report # 69 (November 07, 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 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.

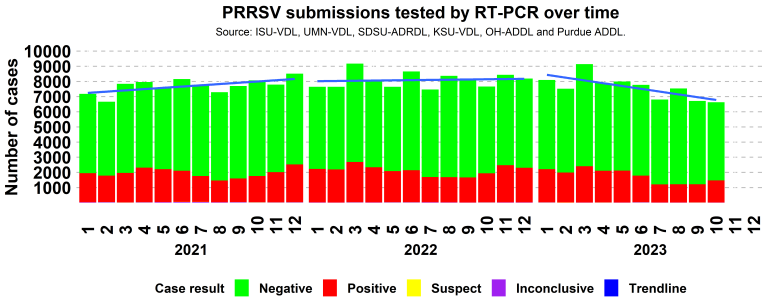
Audio and video reports: Key findings from SDRS projects are summarized monthly in a conversation between investigators and available in the form of an "audio report" and "video report" through Spotify, Apple Podcast, Google podcast, SwineCast, YouTube, LinkedIn, and the SDRS webpage.

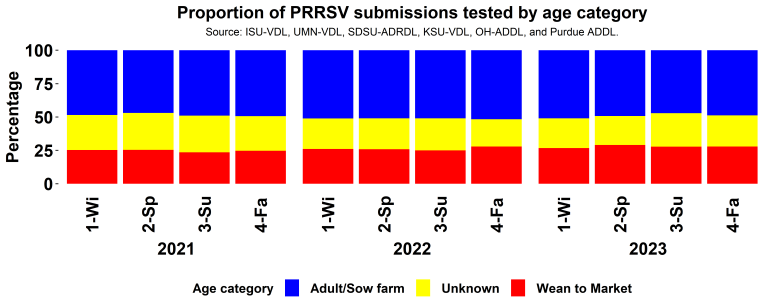
Advisory Group: Reviews and discusses the data, providing their comments and perspectives monthly: Mark Schwartz, Paul Sundberg, Paul Yeske, Deborah Murray, Brigitte Mason, Peter Schneider, Sam Copeland, Luc Dufresne, Daniel Boykin, Corrine Fruge, William Hollis, Rebecca Robbins, Thomas Petznick and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

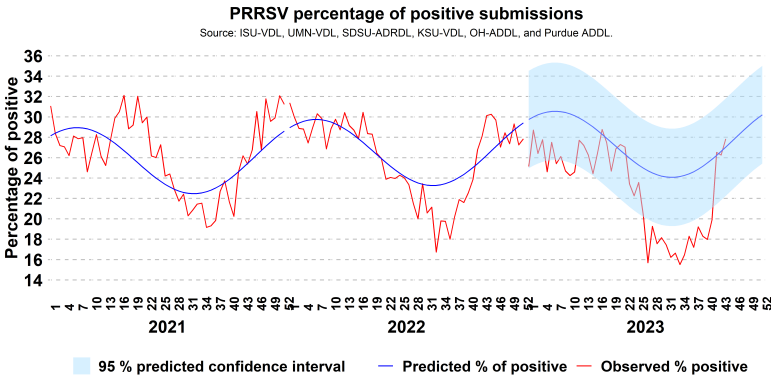
In addition to this report, interactive dashboards and educational material are available at www.fieldepi.org/SDRS.

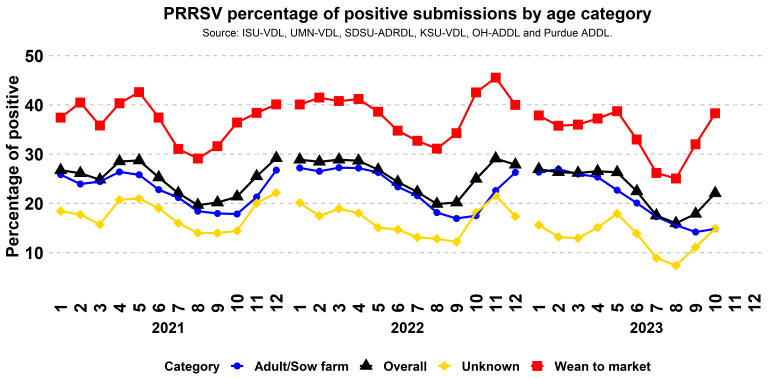
Note: This report contains data up to October 31, 2023.

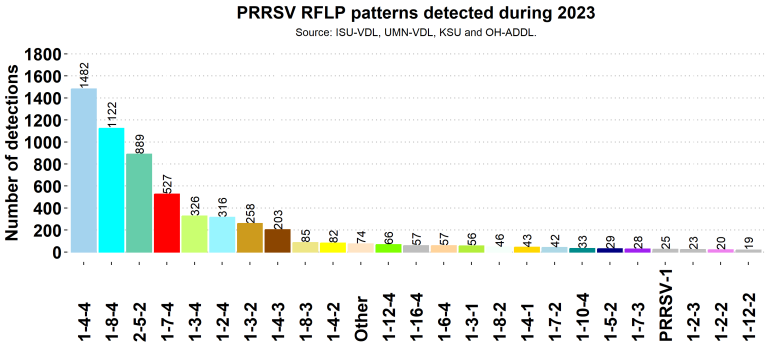
Topic 1 – Detection of PRRSV RNA over time by RT-qPCR.











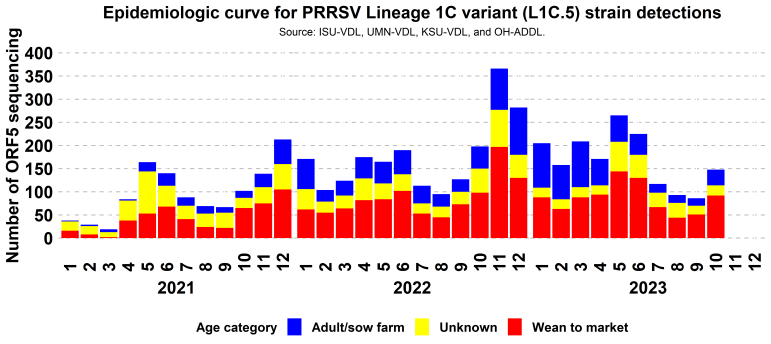
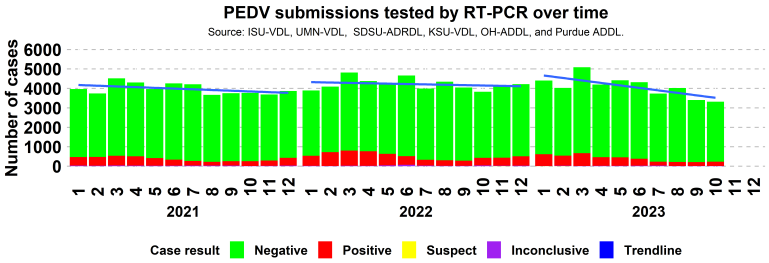


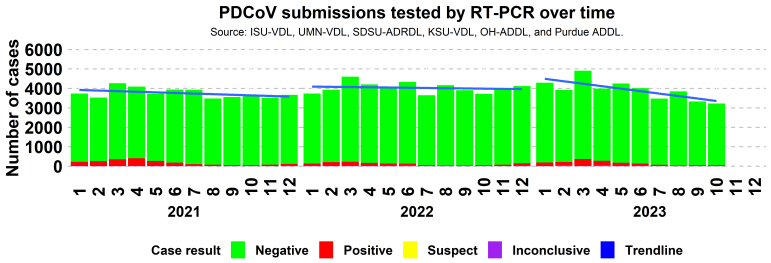
Figure 1. Top: *Left*: Results of PRRSV RT-PCR cases over time; *Right*: Proportion of accession ID cases tested for PRRSV by age group per year and season. **Middle**: *Left* Expected percentage of positive results for PRRSV RNA by RT-qPCR, with 95% confidence interval band for predicted results based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

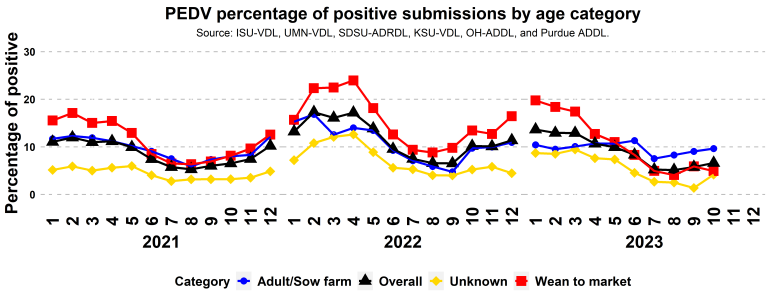
SDRS Advisory Group highlights:

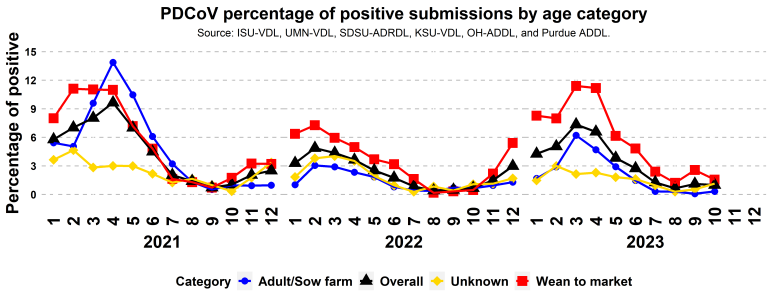
- Overall, 22.07% of 6,629 cases tested PRRSV-positive in October, a moderate increase from 17.88% of 6,713 in September;
  - Positivity in the adult/sow category in October was 14.81% (474 of 3,200), similar to 14.21% (470 of 3,308) in September;
  - Positivity in the wean-to-market category in October was 38.3% (782 of 2,042), a substantial increase from 32.01% (539 of 1,684) in September;
  - Overall PRRS-percentage of positive was 3 standard deviations from state-specific baselines in IL and OH;
- During October 2023, PRRSV L1C variant (L1C.5) strains were detected in IA (90), MN(29), MO (15), NE (12), OH (3), SD (1), IN (1), and PA (1).

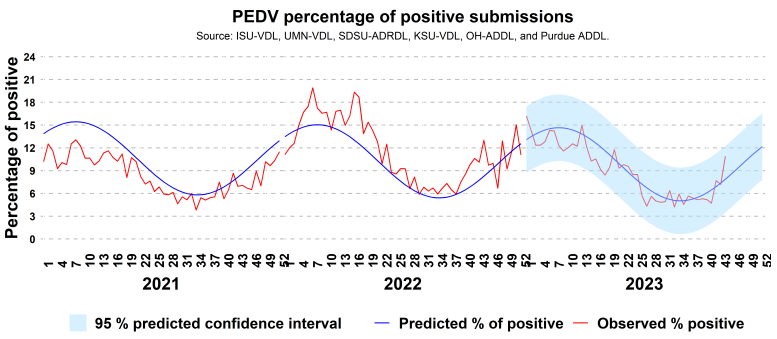
Topic 2 – Enteric coronavirus RNA detection by RT-qPCR

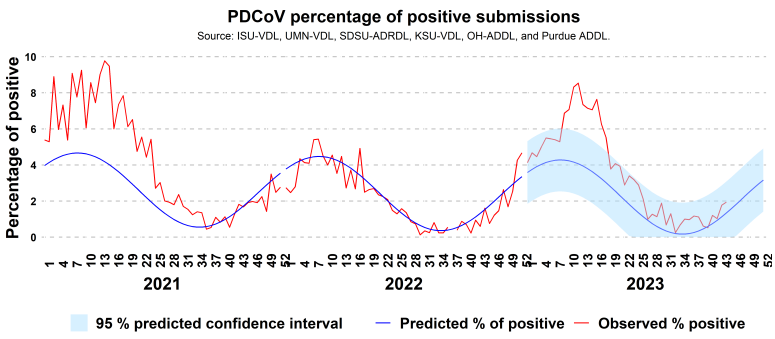












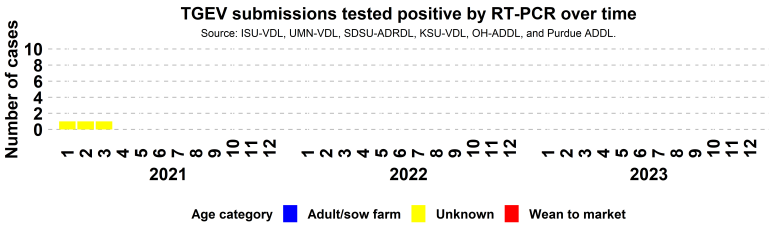


Figure 2. Top: *Left* PEDV; *right* PDCoV cases tested by RT-PCR over time. **Second from top:** *Left* PEDV; *Right* PDCoV percentage of PCR-positive results, by age category over time. **Third from top:** *Left* PEDV; *right* PDCoV expected percentage of positive results for cases tested by RT-qPCR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

SDRS Advisory Group highlights:

- Overall, 6.61% of 3,315 cases tested PEDV-positive in October, similar to 5.79% of 3,405 in September;
  - Positivity in the adult/sow category in October was 9.65% (125 of 1,295), similar to 9.04% (112 of 1,239) in September;
  - Positivity in the wean-to-market category in October was 4.92% (64 of 1,301), similar to 5.89% (72 of 1,223) in September;
  - Overall PEDV-percentage of positive cases was 3 standard deviations from state-specific baselines in IA, MO, and NC;
- Overall, 0.99% of 3,224 cases tested PDCoV-positive in October, similar to 1.11% of 3,331 in September;
  - Positivity in the adult/sow category in October was 0.32% (4 of 1,243), similar to 0.08% (1 of 1,196) in September;
  - Positivity in the wean-to-market category in October was 1.56% (20 of 1,281), similar to 2.57% (31 of 1,206) in September;
  - Overall PDCoV-percentage of positive cases was within state-specific baselines in all 11 monitored states;
- There was 0 positive case for TGEV RNA-PCR in October, 2023 over a total of 3,103 cases tested. It has been 32 months (with a total of 118,354 cases tested) since the last TGEV PCR-positive result;
- PEDV positivity in the adult/sow farm was above the wean-to-market age category for the last three months (October, September, and August). This scenario has been seen only in 2016 and 2017 in the historical PEDV database;
- The advisory group highlighted that the scenario of adult/sow farm positivity above the wean-to-market category for PEDV was correlated with finishing sites cleaning up faster in 2023. Therefore, a decreased number of positive samples were coming from wean-to-finish sites. Another factor pointed out by the advisory group was once some production systems knew the sow farm was positive, they stopped testing for PEDV downstream, decreasing the number of samples from wean-to-finish sites.

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

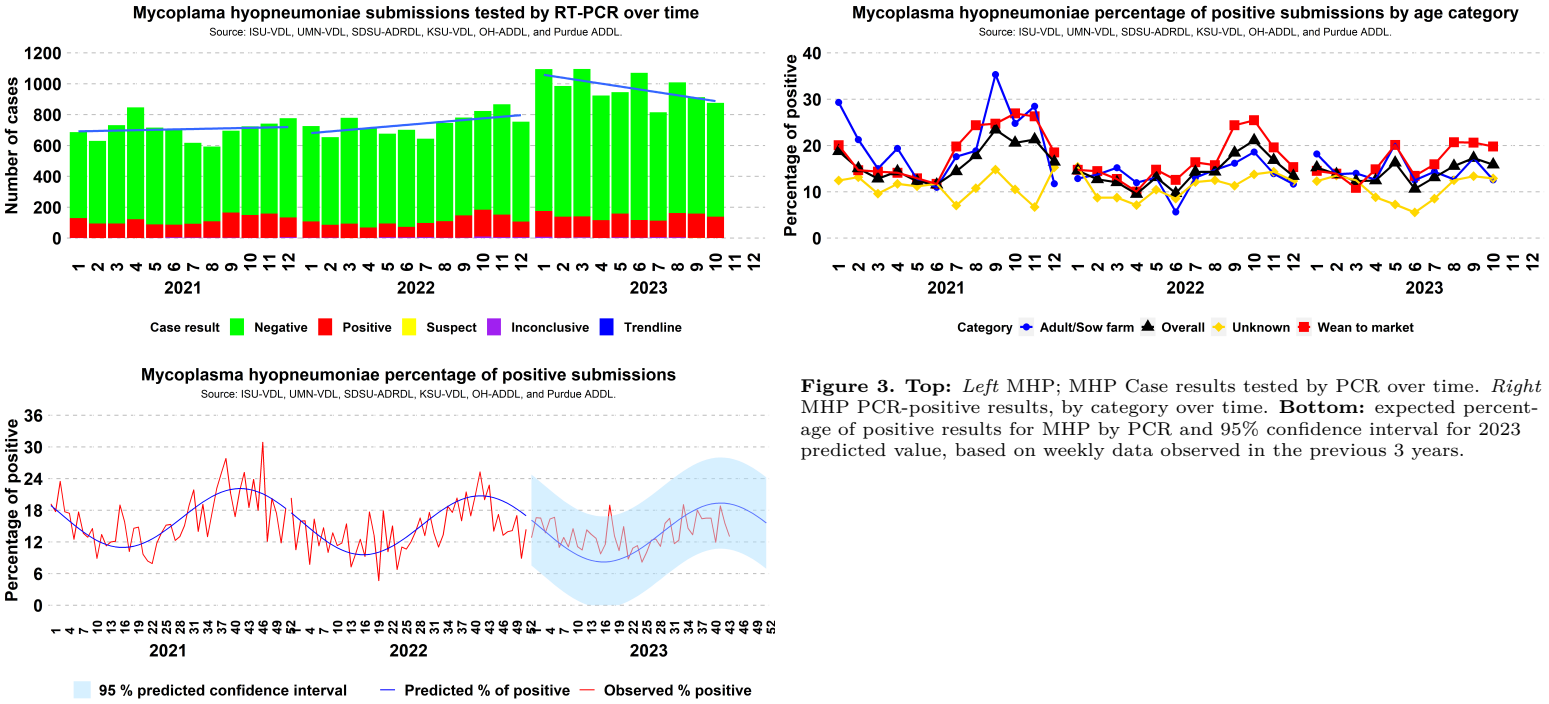


Figure 3. Top: *Left* MHP; MHP Case results tested by PCR over time. *Right* MHP PCR-positive results, by category over time. **Bottom:** expected percentage of positive results for MHP by PCR and 95% confidence interval for 2023 predicted value, based on weekly data observed in the previous 3 years.

SDRS Advisory Group highlights:

- Overall, 15.87% of 876 cases tested *M. hyopneumoniae*-positive cases in October, similar to 17.31% of 913 in September;
- Positivity in the adult/sow category in October was 12.59% (34 of 270), a moderate decrease from 17.28% (56 of 324) in September;
- Positivity in the wean-to-market category in October was 19.79% (77 of 389), similar to 20.62% (66 of 320) in September;
- Overall MHP-percentage of positive was was 3 standard deviations from state-specific baselines in MO.

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

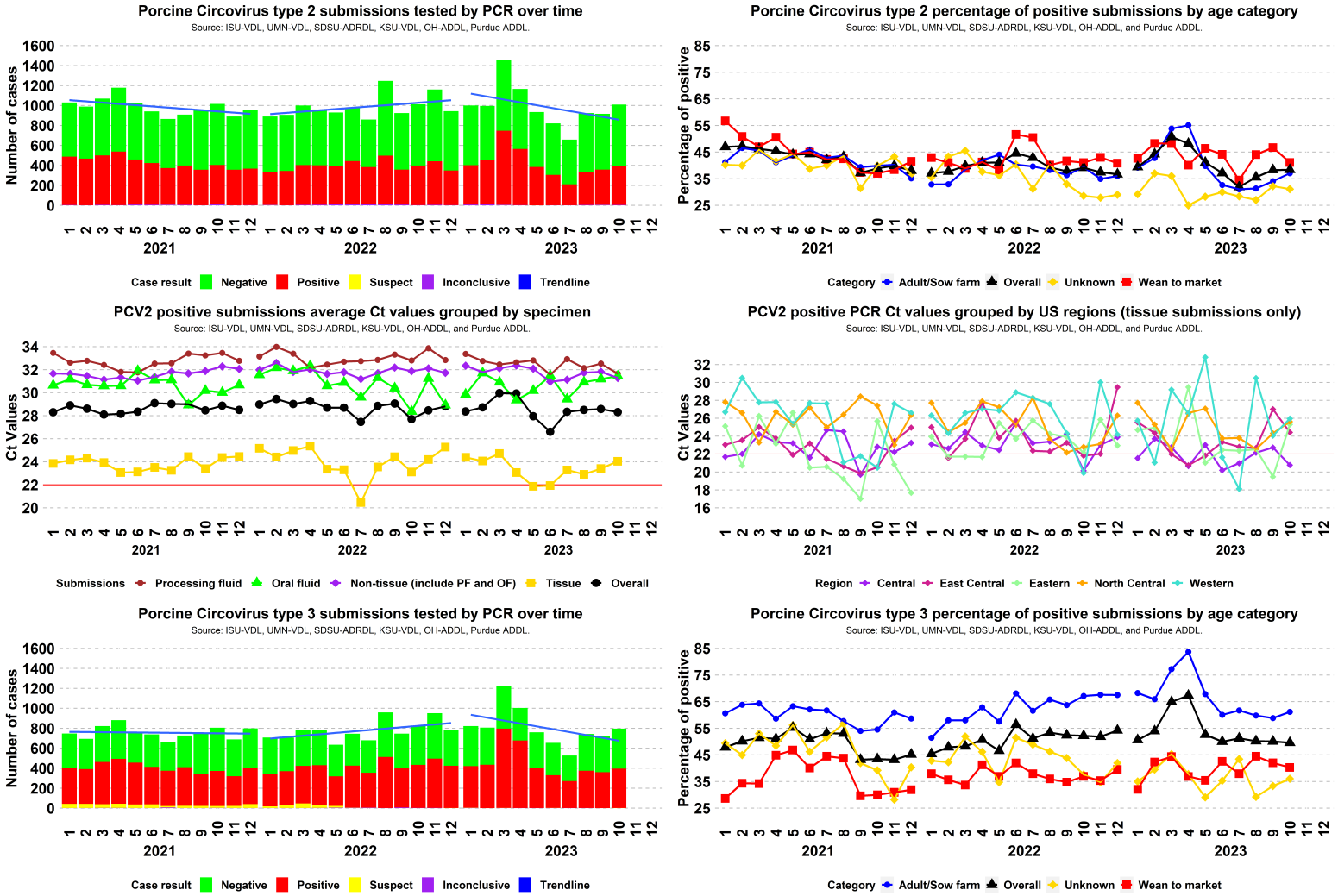
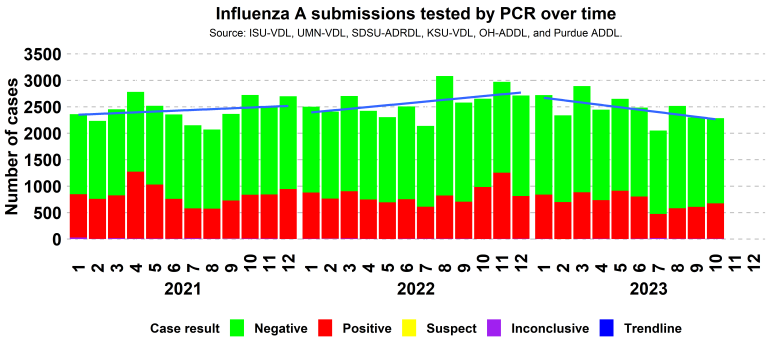


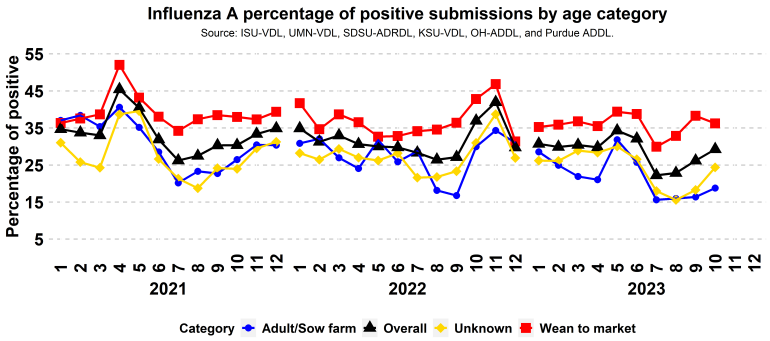
Figure 1. Top: *Left*: Results of PCV2 PCR cases over time; *Right*: PCV2 PCR-positive results, by category over time. **Middle**: *Left*: Average Ct values of PCV2 submissions by specimen; *Right*: Average Ct values of PCV2 tissue submissions by U.S. region; Central (IA), East Central (IL, IN, MO and 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, 38.35% of 1,009 cases tested PCV2-positive in October, similar to 38.28% of 917 in September;
- Positivity in the adult/sow category in October was 37.1% (174 of 469), a moderate increase from 34.06% (173 of 508) in September;
- Positivity in the wean-to-market category in October was 41.11% (185 of 450), a substantial decrease from 46.71% (149 of 319) in September;
- In the month of October, the regions with the lowest PCV2 average Ct values was Central (45 submissions; average Ct 20.8), East Central (14 submissions; average Ct 24.4), Eastern (28 submissions; average Ct 25.3), North Central (28 submissions; average Ct 25.6), and Western (16 submissions; average Ct 26);
- Overall, 49.56% of 797 cases tested PCV3-positive in October, similar to 50.07% of 719 in September;
- Positivity in the adult/sow category in October was 61.19% (227 of 371), a moderate increase from 58.82% (230 of 391) in September;
- Positivity in the wean-to-market category in October was 40.29% (137 of 340), similar to 42.02% (100 of 238) in September;

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





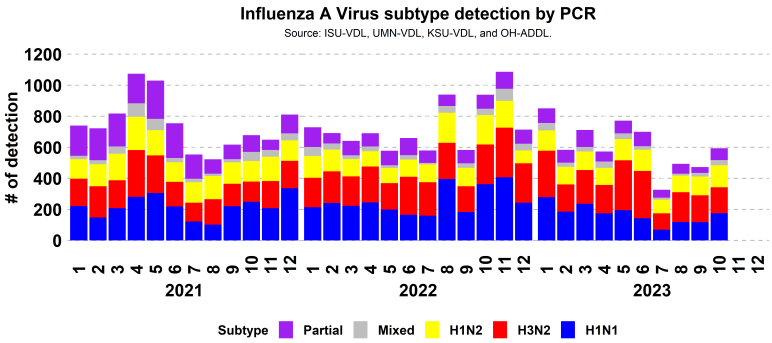


Figure 3. Top: *Left* Results of IAV PCR cases over time. *Right* Percentage of IAV PCR-positive results, by category over time. **Bottom:** Number of IAV subtyping PCR detection over time; (Partial - only hemagglutinin or neuraminidase region detected; Mixed - 3 or more haemagglutinin and neuroamnidase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

SDRS Advisory Group highlights:

- Overall, 29.27% of 2,286 cases tested IAV-positive cases in October, a moderate increase from 26.19% of 2,299 in September;
  - Positivity in the adult/sow category in October was 18.8% (100 of 532), a moderate increase from 16.4% (83 of 506) in September;
  - Positivity in the wean-to-market category in October was 36.24% (432 of 1,192), a moderate decrease from 38.28% (366 of 956) in September.
- Overall, 5.56% of 594 samples had mixed subtype detection in October, similar to 4.86% of 473 in September;

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

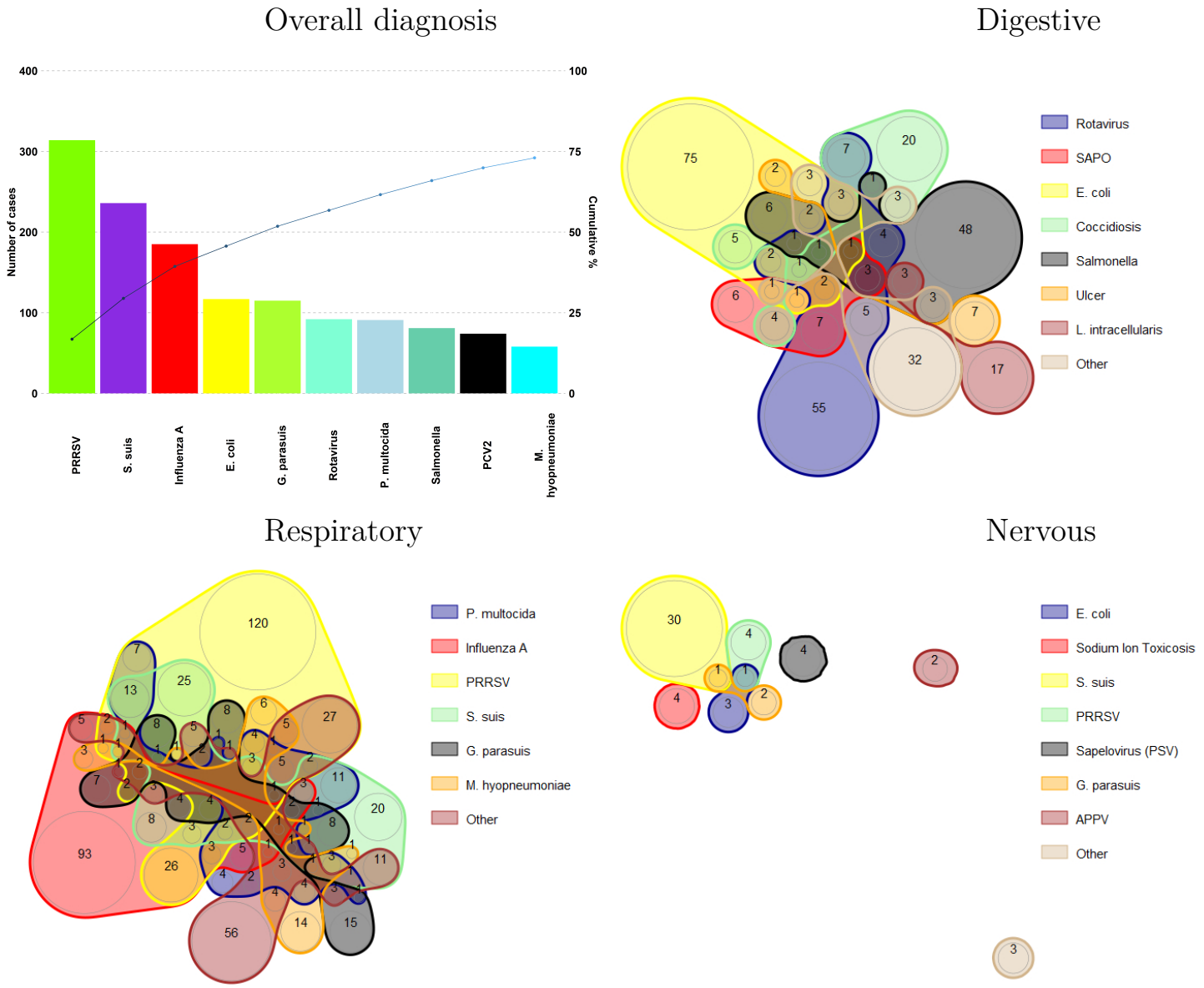


Figure 4. ISU-VDL most frequent overall confirmed tissue disease diagnosis. The presented system is described in the title of the chart. Colors represent one agent; line intersections present diagnosis of 2 or more agents within a submission. Only the most frequent etiology/disease are presented. Less 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 September. 1 to October. 19, 2023.

SDRS Advisory Group highlights:

• PRRSV (314) led cases with confirmed etiology, followed by *S. suis* (236), and Influenza A (185). PRRSV (295 of 1024) led the number of confirmed respiratory diagnoses, *E. coli* (106 of 421) lead the number of confirmed digestive diagnoses, and *S. suis* (31 of 56) led the number of confirmed neurological diagnoses.

• Between the weeks of September 25th and October 9th, there were spikes in the number of PRRSV, *Glaesserella parasuis*, *Streptococcus suis*, and *Pasteurella multoocida* 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 Porcine Circovirus Type 3 (PCV3) PCR detection is now available on the monthly PDF reports

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The Swine Disease Reporting System (SDRS) has the goal of sharing 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. Porcine circovirus type 3 (PCV3) was first detected in 2016 in the U.S. (Palinski, 2016), and since then demonstrated to be an endemic virus in the herds being correlated clinically with reproductive failure and multisystemic inflammatory disease (Arruda, 2019). However, the clinical and economic importance of PCV3 are still unknown. After a request from our stakeholders, the SDRS brings onboard information for PCV3 DNA detection by PCR To help producers and veterinarians in best understanding and identify PCV3 trends of detection overtime. Historical data was fully incorporated, and a new page starting on SDRS report # 69 will bring monthly updates about PCV3 DNA detection. The major highlights for PCV3 detection are:

Highlights:

- PCV3 positivity from the category adult/sow farm is higher than PCV2. Since 2019, the percentage of PCV3 positive submissions from adult/sow farm was at least 10% higher than PCV2 submissions (Figure 1);
- From 2019 until 2023, 73.36% (7,331 of 9,993) of the positive specimens from the adult/sow farm were processing fluids, followed by oral fluid 7.30% (730 of 9,993), and serum 4.66% (466 of 9,993).
- Differently from all other pathogens monitored in the SDRS, PCV3 detection is lower over time in the wean-to-market than in the adult/sow farm age category.

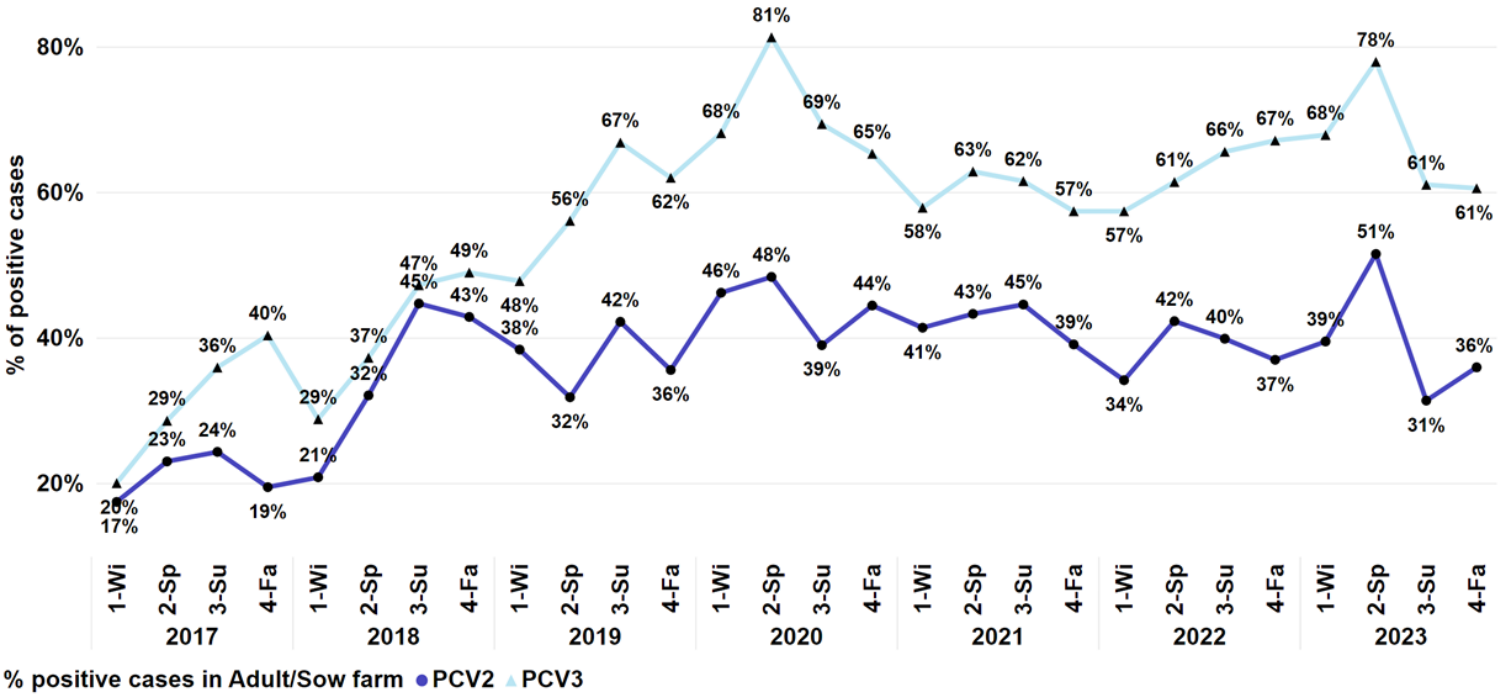

Figure 1: Percentage of positive submissions of PCV3 (light blue line) and PCV2 (dark blue line) over the years and seasons tested by PCR over time.;

Highlights:

• The number of submissions tested for PCV2 and PCV3 simultaneously has increased since 2018. In the summer of 2023, 73 percent of the cases tested for PCV2 where also tested for PCV3, the highest number according to the historical data;

• Lungs, processing fluid, and oral fluids are the specimen most frequently tested for both pathogens. Processing fluid leads the percentage of PCV2/PCV3 co-detection with 47% of the cases (3,828 of 7,989) followed by oral fluids 22% (1,761 of 7,989), and lungs 13% (1,053 of 7,989).

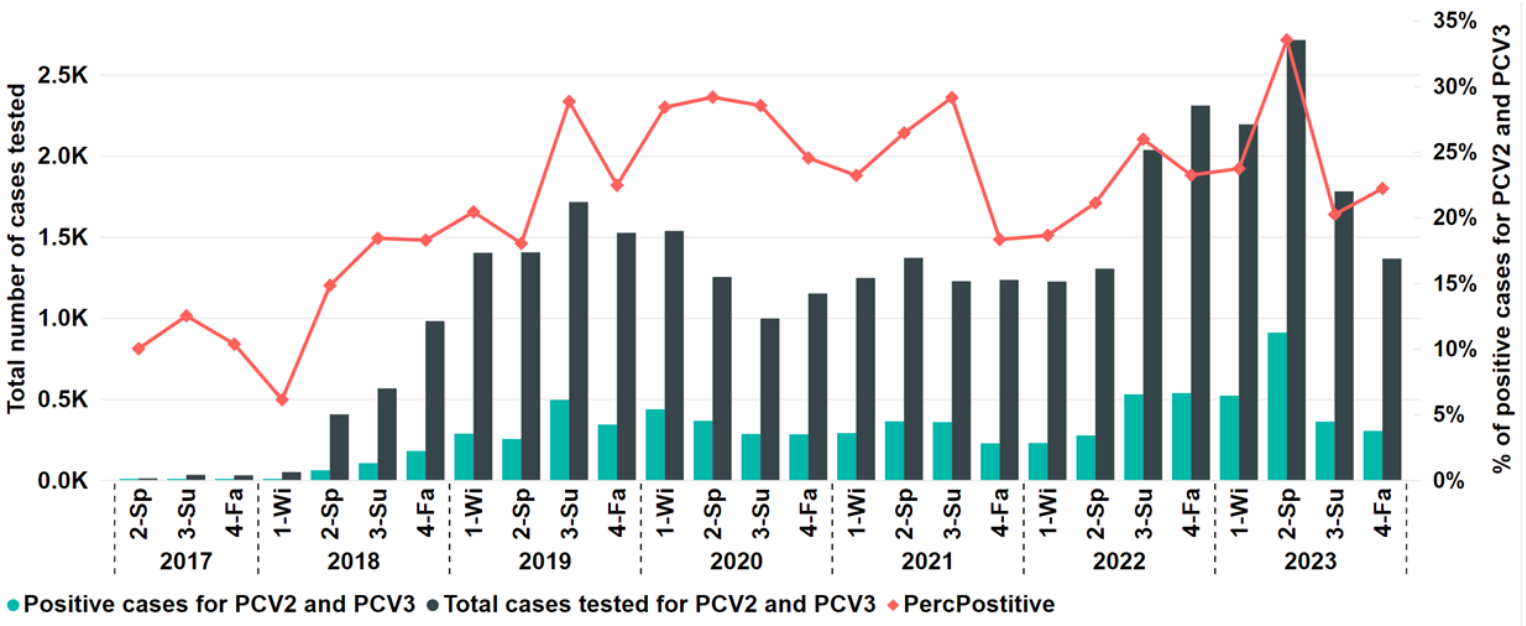

Figure 2: Total number of submissions tested for PCV2 and PCV3 (green bars) by PCR and Number of PCV2/PCV3 positive submissions within a same case tested by PCR (balck bars) over time. Red line represents the percentage of positive cases for both PCV2 and PCV3 within the same submission.