Swine Disease Reporting System
Report # 52 (June 7, 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 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.

Iowa State University: Gustavo Silva, Marcelo Almeida, Bret Crim, Eric Burrough, Phillip Gauger, 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 Diag. Lab.: Melanie Prarat, William Hennessy, 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.

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 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 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, Tara Donovan, Deborah Murray, Scott Dee, Melissa Hensch, Brigitte Mason, Peter Schneider, Sam Copeland, Luc Dufresne, and Daniel Boykin.

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, 2022.

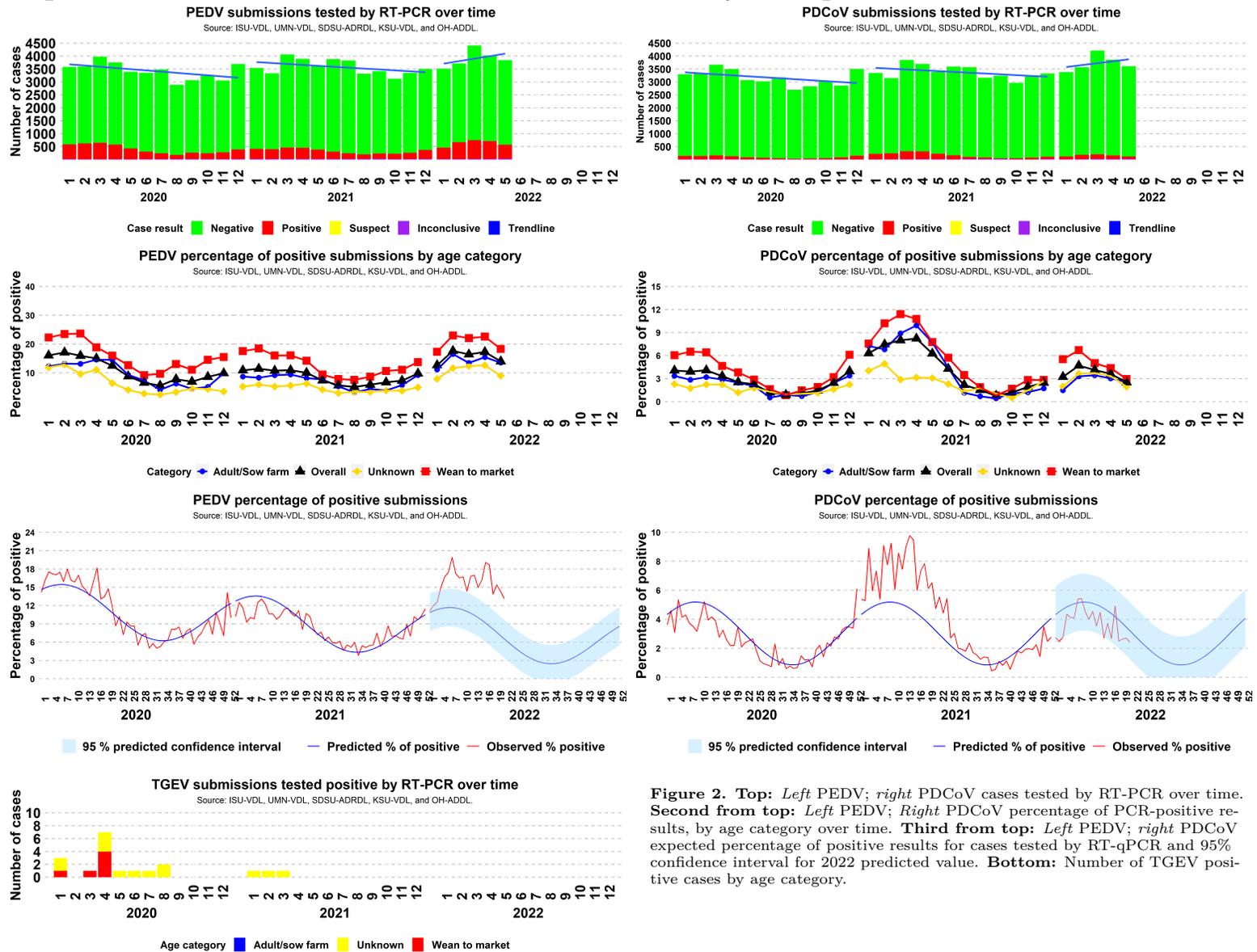# Topic 1 – Detection of PRRSV RNA over time by RT-qPCR.
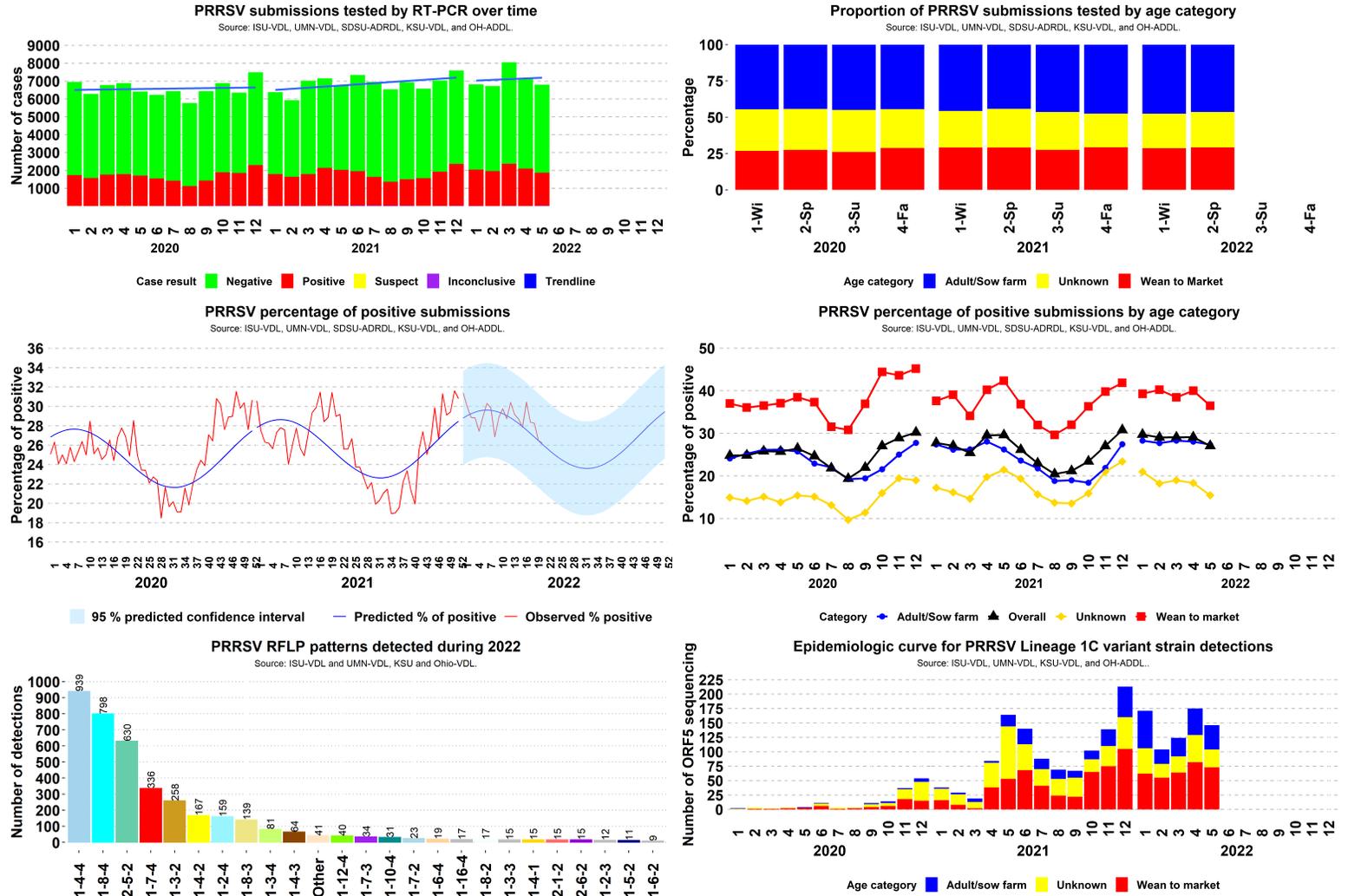
Figure 1. Top: *Left*: Results of PRRSV RT-PCR cases over time; *Right*: Proportion of accession ID cases tested for PRRSV by age group per year and season. **Middle**: *Left* Expected percentage of positive results for PRRSV RNA by RT-qPCR, with 95% confidence interval band for predicted results based 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 2022; *Right*: Epidemiological curve of detection for PRRSV Lineage 1C variant strain.
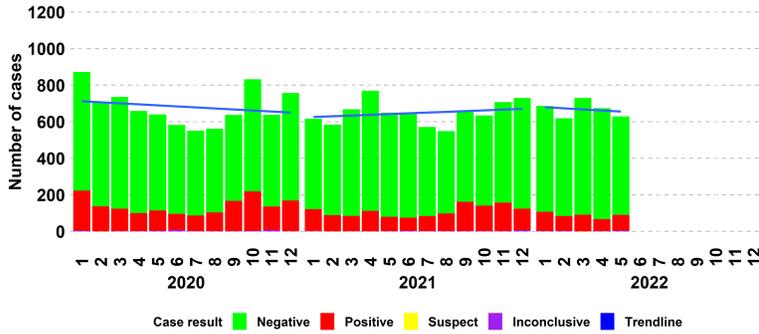
SDRS Advisory Group highlights:

- Overall, 27.06% of 6,804 cases tested PRRSV-positive in May, a moderate decrease from 29.09% of 7,168 in April;
- Positivity in the adult/sow category in May was 27.34% (843 of 3,083), similar to 28.05% (924 of 3,294) in April;
- Positivity in the wean-to-market category in May was 36.48% (734 of 2,012), a moderate decrease from 40% (832 of 2,080) in April;
- Overall PRRSV-percentage of positive cases was 3 standard deviations from state-specific baselines in NE, IL, IN, and MO;
- The predominant wild-type PRRSV strains detected from January to May 2022 in states with RT-PCR detection above state-specific baseline were: Missouri – Lineage 1A RFLP 1-8-3 (25.22%) and Lineage 1C variant RFLP 1-4-4 (24.38%); Indiana – Lineage1A RFLP 1-7-4 (26.24%) and Lineage A RFLP 1-4-4 (14.38%); Nebraska – Lineage 1H RFLP 1-8-4 (33.12%) and Lineage 1C RFLP 1-3-2 (18.13%); Illinois - Lineage 1H RFLP 1-4-3 (14.29%) and Lineage 1A RFLP 1-4-4 (13.57%).
- The advisory group highlighted that levels of detection and PRRSV strains detected across regions align with field observations. Various PRSSV strains and in some states (NE, MO), the introduction of new PRRSV strains, e.g., L1C variant, have been keeping the levels of detection above state-specific baselines. Practices currently implemented in the swine industry, like animal movements across regions and increased infection pressure, may have contributed to additional PRRSV activity in those regions. States with PRRSV detection within state-specific baselines follow the expected levels of detection and activity for this time of the year.

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Topic 2 – Enteric coronavirus RNA detection by RT-qPCR

PEDV submissions tested by RT-PCR over time
Source: ISU-VDL, UMN-VDL, SDSU-ADRDL, KSU-VDL, and OH-ADDL.

PDCoV submissions tested by RT-PCR over time
Source: ISU-VDL, UMN-VDL, SDSU-ADRDL, KSU-VDL, and OH-ADDL.

Case result: Negative | Positive | Suspect | Inconclusive | Trendline

PEDV percentage of positive submissions by age category
Source: ISU-VDL, UMN-VDL, SDSU-ADRDL, KSU-VDL, and OH-ADDL.

PDCoV percentage of positive submissions by age category
Source: ISU-VDL, UMN-VDL, SDSU-ADRDL, KSU-VDL, and OH-ADDL.

Category: Adult/Sow farm | Overall | Unknown | Wean to market

PEDV percentage of positive submissions
Source: ISU-VDL, UMN-VDL, SDSU-ADRDL, KSU-VDL, and OH-ADDL.

PDCoV percentage of positive submissions
Source: ISU-VDL, UMN-VDL, SDSU-ADRDL, KSU-VDL, and OH-ADDL.

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

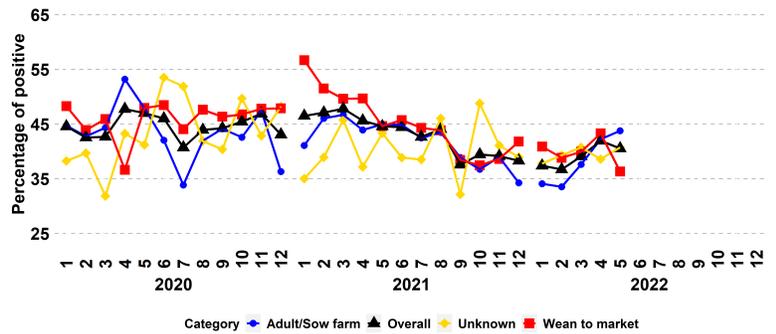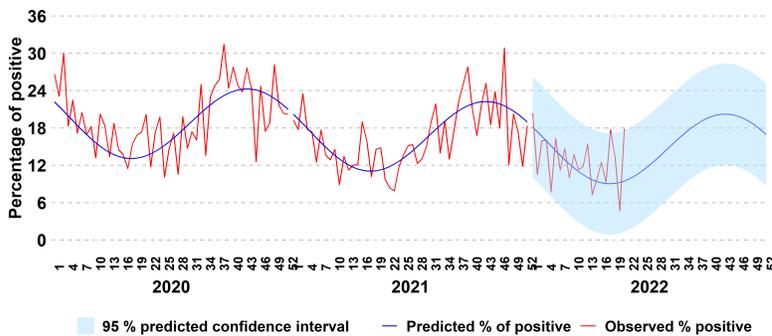**TGEV submissions tested positive by RT-PCR over time**
Source: ISU-VDL, UMN-VDL, SDSU-ADRDL, KSU-VDL, and OH-ADDL.

Age category: Adult/sow farm | Unknown | Wean to market

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 2022 predicted value. **Bottom:** Number of TGEV positive cases by age category.

SDRS Advisory Group highlights:

- Overall, 14.01% of 3,840 cases tested PEDV-positive in May, a moderate decrease from 17.26% of 4,027 in April;
  - Positivity in the adult/sow category in May was 13.54% (170 of 1,256), similar to 15.46% (203 of 1,313) in April;
  - Positivity in the wean-to-market category in May was 18.31% (267 of 1,458), a moderate decrease from 22.59% (338 of 1,496) in April;
  - The overall PEDV-percentage of positive cases was 3 standard deviations from state-specific baselines in NC, KS, IA, MO, and MN;
- Overall, 2.52% of 3,610 cases tested PDCoV-positive in May, similar to 3.62% of 3,863 in April;
  - Positivity in the adult/sow category in May was 2.55% (30 of 1,178), similar to 3.03% (38 of 1,255) in April;
  - Positivity in the wean-to-market category in May was 2.95% (40 of 1,356), similar to 4.38% (63 of 1,440) in April;
  - Overall PDCoV-percentage of positive cases was within state-specific baselines in all 11 monitored states;
- There was 0 positive case for TGEV RNA in May, 2022 over a total of 3,517 cases tested;
- The advisory group highlighted that during the first quarter of 2022, the levels of detection and activity of PEDV were atypical. The PEDV has found some opportunities to sneak into production systems and channels, causing unexpected sow farm breaks and consequently contributing to weaning positive piglets, increasing regional pressure of infection. A variety of factors such as failures in farm entry biosecurity, hauling truck washing and disinfection, labor shortage, and overstocking contributing to inadequate condition to proper washing and disinfection of sites are reasons for increased PEDV activity. On the other side, control and elimination programs implemented in breeding herds are being successful. Also, warm summer temperatures are expected to help in controlling PEDV.

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Topic 3 – Detection of *M. hyopneumoniae* and Porcine Circovirus-2 DNA by PCR.

Figure 3. Top: Case results tested by PCR over time. *Left* MHP; *Right* PCV2. **Middle:** percentage of PCR-positive results, by category over time. **Bottom:** expected percentage of positive results for MHP by PCR and 95% confidence interval for 2022 predicted value, based on weekly data observed in the previous 3 years.

SDRS Advisory Group highlights:

- Overall, 13.51% of 629 cases tested *M. hyopneumoniae*-positive cases in May, a moderate increase from 9.79% of 674 in April;
  - Positivity in the adult/sow category in May was 15.38% (18 of 117), moderate increase from 13.27% (13 of 98) in April;
  - Positivity in the wean-to-market category in May was 14.51% (47 of 324), a moderate increase from 10.11% (37 of 366) in April;
  - Overall MHP-percentage of positive was within state-specific baselines in all 11 monitored states;
- Overall, 40.55% of 767 cases tested PCV2-positive in May, similar to 41.95% of 870 in April;
  - Positivity in the adult/sow category in May was 43.79% (155 of 354), similar to 42.23% (144 of 341) in April;
  - Positivity in the wean-to-market category in May was 36.33% (101 of 278), a substancial decrease from 43.3% (155 of 358) in April.

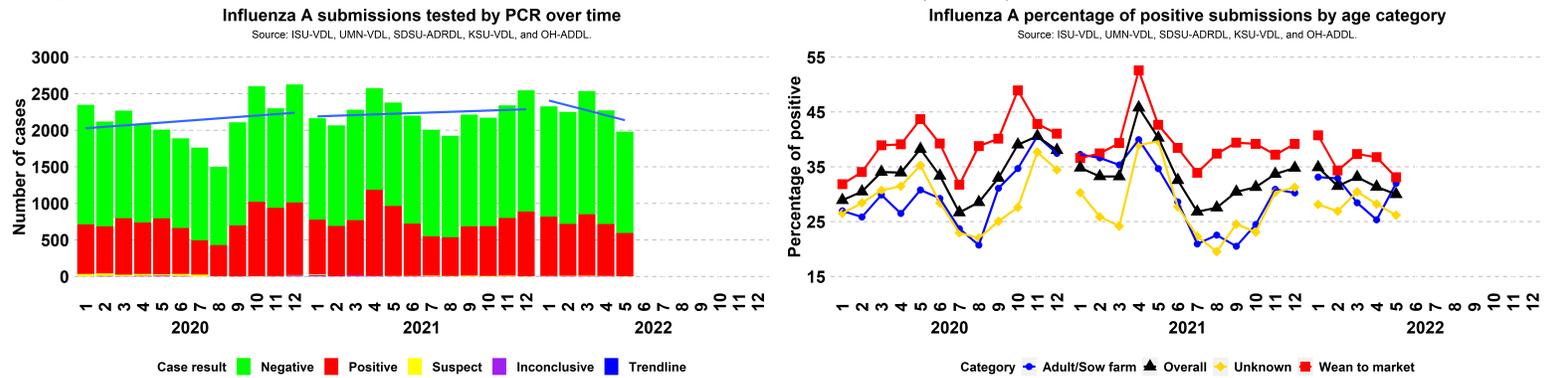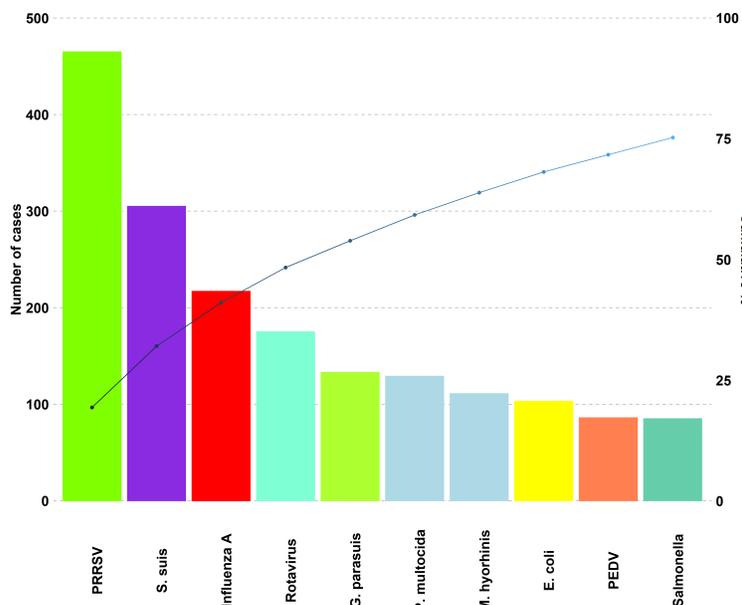# Topic 4 – Detection of Swine Influenza A Virus (IAV) RNA by RT-PCR.

Figure 3. *Left*: Results of IAV PCR cases over time. *Right*: Percentage of IAV PCR-positive results, by category over time.

## SDRS Advisory Group highlights:

- Overall, 29.98% of 1,981 cases tested IAV-positive cases in May, similar to 31.35% of 2,268 in April;
  - Positivity in the adult/sow category in May was 32.01% (113 of 353), a substancial increase from 25.32% (98 of 387) in April;
  - Positivity in the wean-to-market category in May was 33.08% (263 of 795), a moderate decrease from 36.75% (351 of 955) in April.
- The advisory group highlighted that recent Influenza A virus activity observed in sow farms is potentially associated with extended cooler spring and abrupt temperature change events. Also, the lower activity of Influenza A in late 2021 and the beginning of 2022 appear to be related to herd closures and depopulation controlling other endemic pathogens such as PEDV and PRRSV, contributing to lower levels of Influenza A detection.

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SDRS
SWINE DISEASE REPORTING SYSTEM
Disease Diagnosis Reports

IOWA STATE UNIVERSITY
Veterinary Diagnostic Laboratory

SHIC
Swine Health Information Center

IOWA PORK
pork
PRODUCERS ASSOCIATION
Successful farmers. Enriched lives.

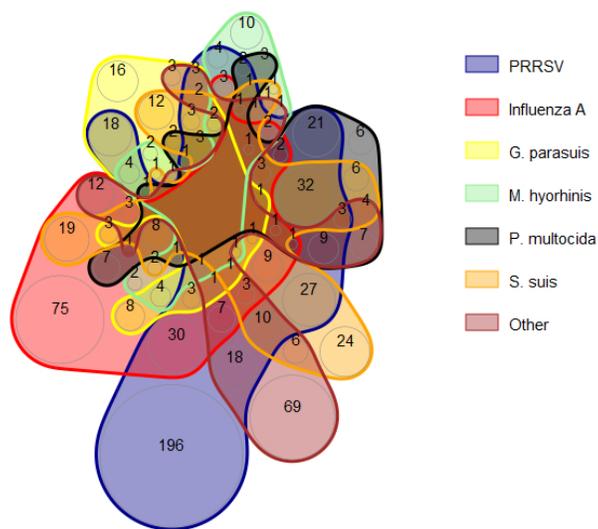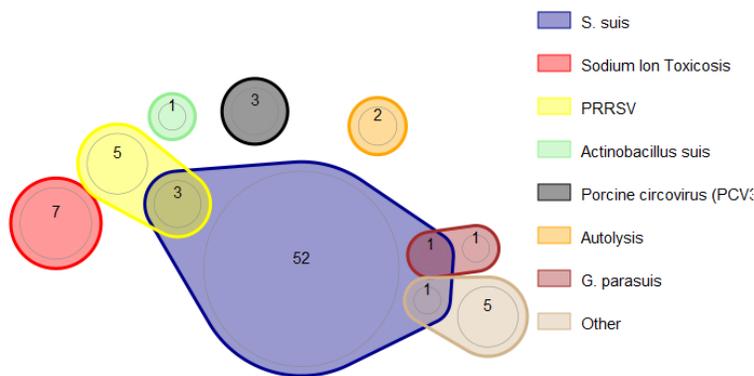# Topic 5 – Confirmed tissue cases etiologic/disease diagnosis at the ISU-VDL.

Overall diagnosis

Digestive
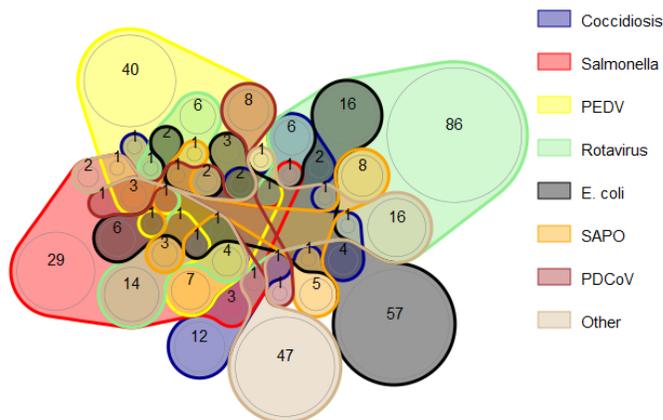
Respiratory

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, 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 April. 1 to May. 25, 2022.

SDRS Advisory Group highlights:
• PRRSV (465) led cases with confirmed etiology, followed by *S. suis* (305), and Influenza A (217). PRRSV (433 of 1315) led the number of confirmed respiratory diagnoses, Rotavirus (175 of 589) lead the number of confirmed digestive diagnoses, and *S. suis* (57 of 86) led the number of confirmed neurological diagnoses;

Current Scenario for Porcine Epidemic Diarrhea Virus (PEDV) Detection Across the Largest US Swine Producer States

Guilherme Cezar[1], Edison Magalhães[1], Giovani Trevisan[1], Daniel Linhares[1]
*1 - Swine Disease Reporting System office, Ames, Iowa, USA.*

Since the introduction of the porcine epidemic diarrhea virus (PEDV) in the United States in 2013 (Stevenson et al. 2013), the swine industry has been fighting this war against PEDV to control and eliminate this agent in many swine production systems. 2021 was celebrated as the year with the lowest levels of PEDV RNA detection by RT-PCR since 2013. Across 41,376 cases tested only 8.7% were PEDV positive. The year of 2022 started promising, with all the 11 states having PEDV state-specific monitoring algorithms presenting the levels of detection within two standard deviations (STD) from state-specific baselines (Trevisan et al. 2021). However, since the end of January, increased levels of detection of PEDV have been identified and in May, 5 states (MN, IA, KS, MO, and NC) had the levels of PEDV detection 3 STDs above the state-specific expected baseline. From January to May of 2022, there were 19,011 submissions tested for PEDV with an overall percentage of positive submissions at 15.75%. The higher number of 2022 submissions came from wean-to-market and represented 7,288 submissions whereas 20.8% were positive. These levels of detection were quite above same period of 2021 when 18,411 submissions were tested with an overall percentage of positive submissions at 10.8%. Even though improvements in biosecurity and biocontainment practices were implemented in the US swine industry after 2013 and continue to be refined, the virus is still finding opportunities to spread across farms and systems. Close monitoring of veterinary diagnostic data provides handy information to aid practitioners and producers in making data-driven animal health decisions. Dashboards are also avaible on the SDRS webpage under *Pathogen Detection and Monitoring at the State Level*.
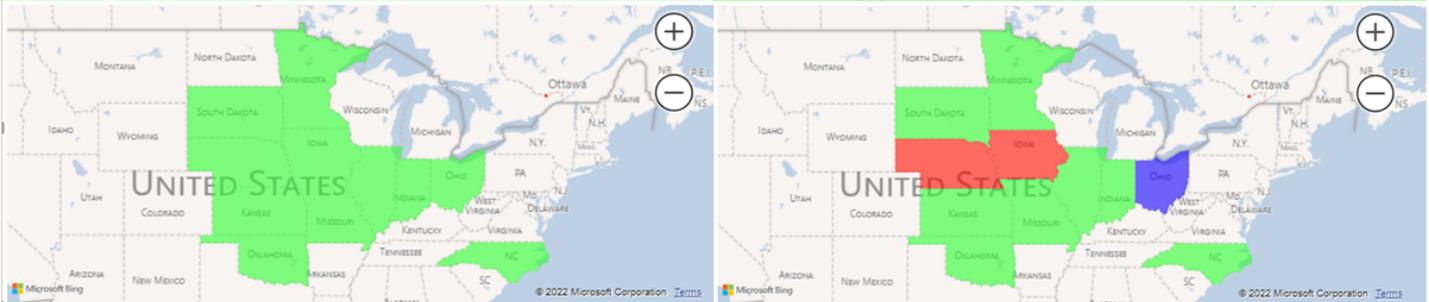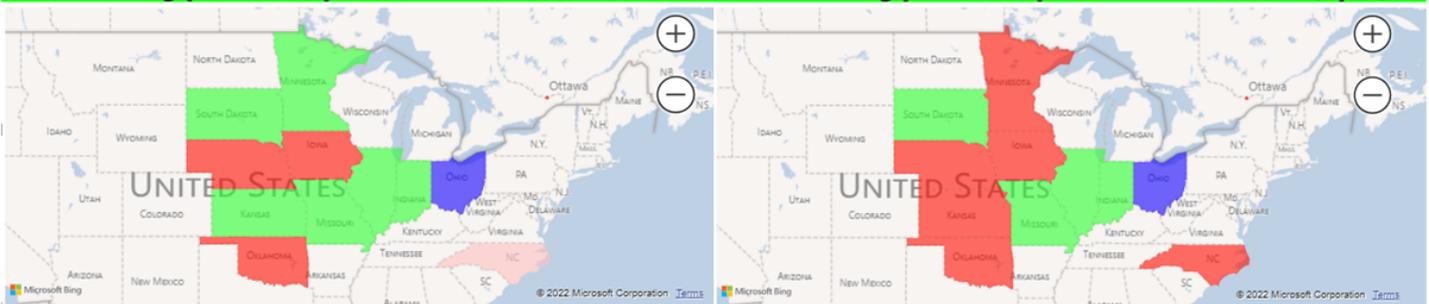
Figure 1. PEDV state-level monitoring January-May 2022. Each color-filled represents the changes in standard deviation from the predicted states' specific percentage of positive submissions baseline.