Swine Disease Reporting System
Report # 56 (October 4, 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, Albert Rovira.

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.

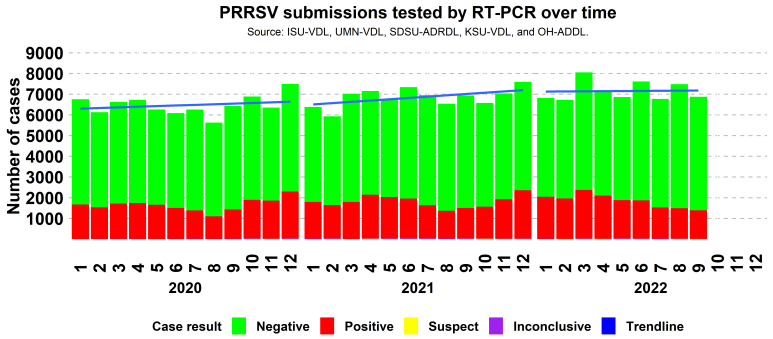
Audio and video reports: Key findings from SDRS projects are summarized monthly in a conversation between investigators and available in the form of an "audio report" and "video report" through Spotify, SwineCast, YouTube, LinkedIn, and the SDRS webpage.

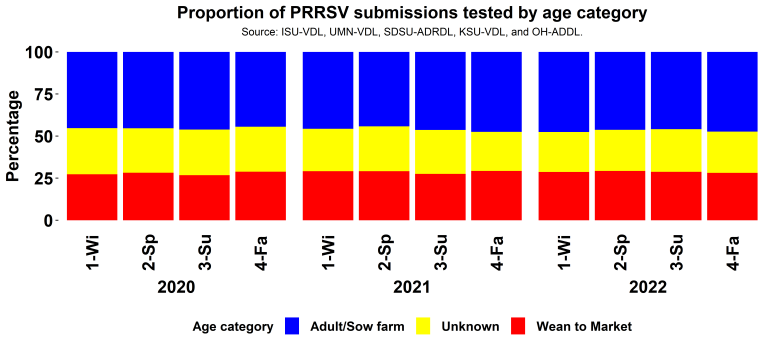
Advisory Group: Reviews and discusses the data, providing their comments and perspectives monthly: Mark Schwartz, Paul Sundberg, Paul Yeske, Tara Donovan, Deborah Murray, Scott Dee, Brigitte Mason, Peter Schneider, Sam Copeland, Luc Dufresne, Daniel Boykin, and Corrine Fruge.

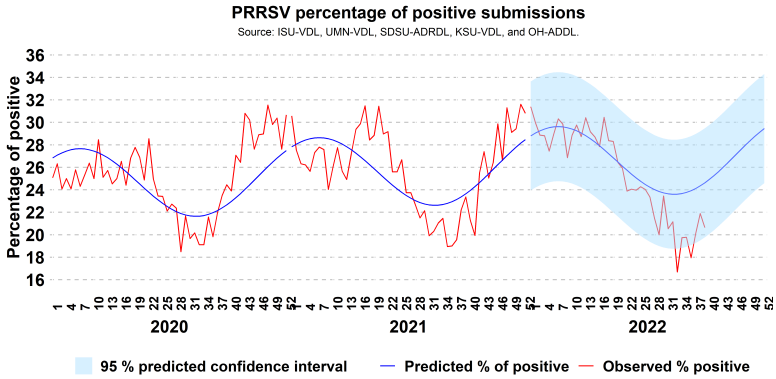
In addition to this report, interactive dashboards with aggregated test results are available at www.fieldepi.org/SDRS.

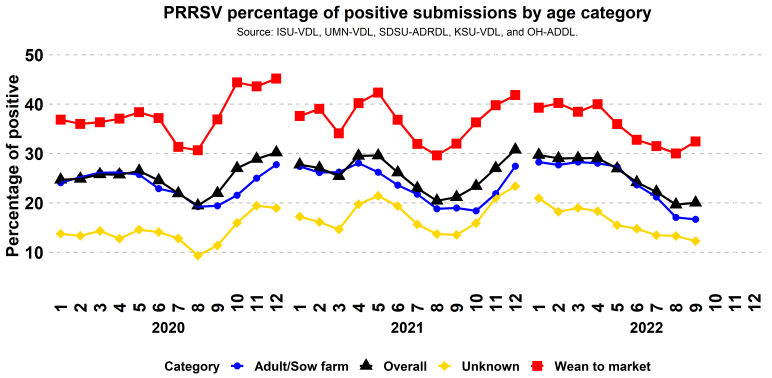
Note: This report contains data up to September 30, 2022.

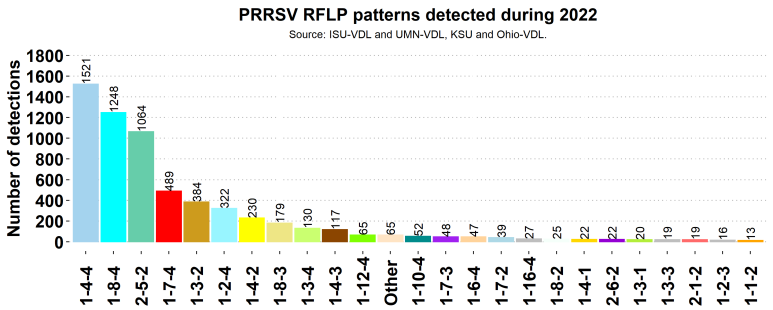
Topic 1 – Detection of PRRSV RNA over time by RT-qPCR.











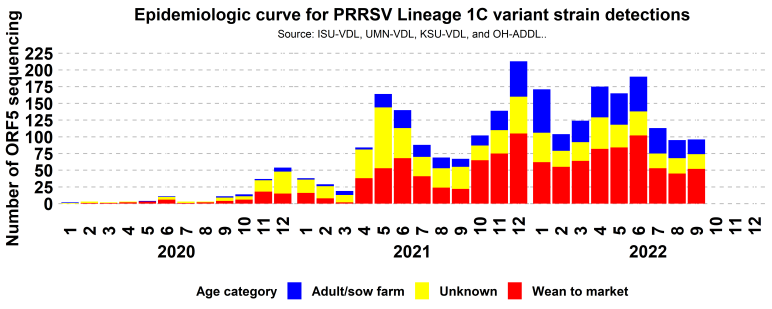


Figure 1. Top: *Left*: Results of PRRSV RT-PCR cases over time; *Right*: Proportion of accession ID cases tested for PRRSV by age group per year and season. **Middle**: *Left* Expected percentage of positive results for PRRSV RNA by RT-qPCR, with 95% confidence interval band for predicted results based 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, 20.05% of 6,878 cases tested PRRSV-positive in September, similar to 19.66% of 7,488 in August;
  - Positivity in the adult/sow category in September was 16.69% (543 of 3,254), similar to 17.07% (593 of 3,473) in August;
  - Positivity in the wean-to-market category in September was 32.46% (629 of 1,938), a moderate increase from 30.02% (619 of 2,062) in August;
  - Overall PRRSV-percentage of positive cases was 3 standard deviations from state-specific baselines in NE and MO;
- The advisory group highlighted that the increased percentage of positive submissions and the increased activity in some states are expected for this specific period, and no atypical PRRSV outbreaks have been reported. However, the increased activity in grow-finish is relatively early for this time of year and reminds people to remain alert with biosecurity and biocontainment to prevent further spread between growing sites and to sow farms.

Topic 2 – Enteric coronavirus RNA detection by RT-qPCR

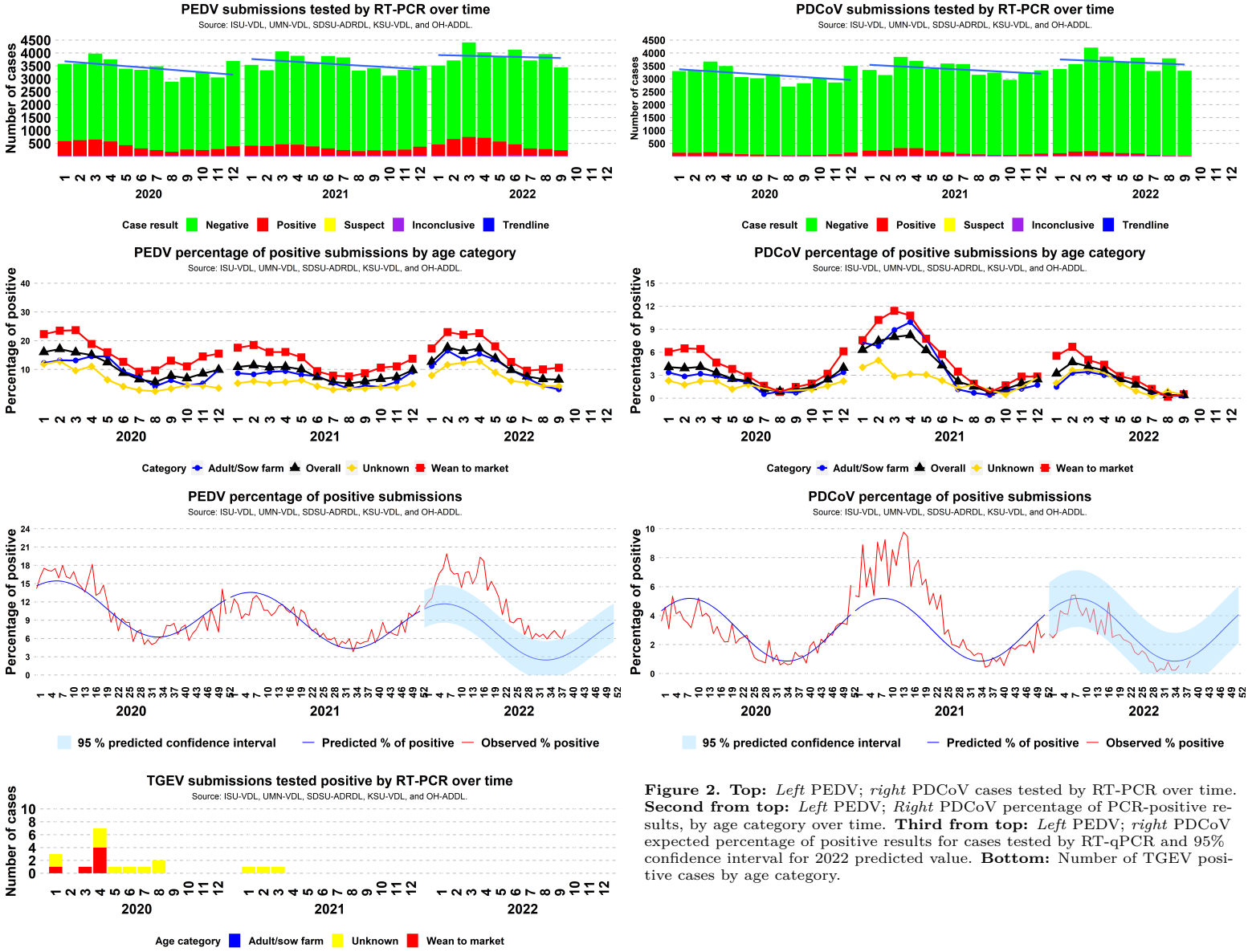


Figure 2. Top: *Left* PEDV; *right* PDCoV cases tested by RT-PCR over time. **Second from top:** *Left* PEDV; *Right* PDCoV percentage of PCR-positive results, by age category over time. **Third from top:** *Left* PEDV; *right* PDCoV expected percentage of positive results for cases tested by RT-qPCR and 95% confidence interval for 2022 predicted value. **Bottom:** Number of TGEV positive cases by age category.

SDRS Advisory Group highlights:

- Overall, 6.48% of 3,444 cases tested PEDV-positive in September, similar to 6.66% of 3,961 in August;
  - Positivity in the adult/sow category in September was 3.09% (34 of 1,100), similar to 4.28% (53 of 1,239) in August;
  - Positivity in the wean-to-market category in September was 10.61% (150 of 1,414), similar to 10.03% (165 of 1,645) in August;
  - The overall PEDV-percentage of positive cases was 3 standard deviations from state-specific baselines in IA, KS, and NC;
- Overall, 0.42% of 3,312 cases tested PDCoV-positive in September, similar to 0.42% of 3,794 in August;
  - Positivity in the adult/sow category in September was 0.28% (3 of 1,071), similar to 0.34% (4 of 1,189) in August;
  - Positivity in the wean-to-market category in September was 0.52% (7 of 1,352), similar to 0.19% (3 of 1,586) in August;
  - 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 September, 2022 over a total of 3,215 cases tested;
- During September PDCoV had a very low overall percentage of positive submissions at 0.42%, and during September 12 to 19 (week 38) 851 submissions (331 wean-to-market, 311 adult/sow farm, and 209 unknown) were tested, and none of them were PDCoV positive.

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

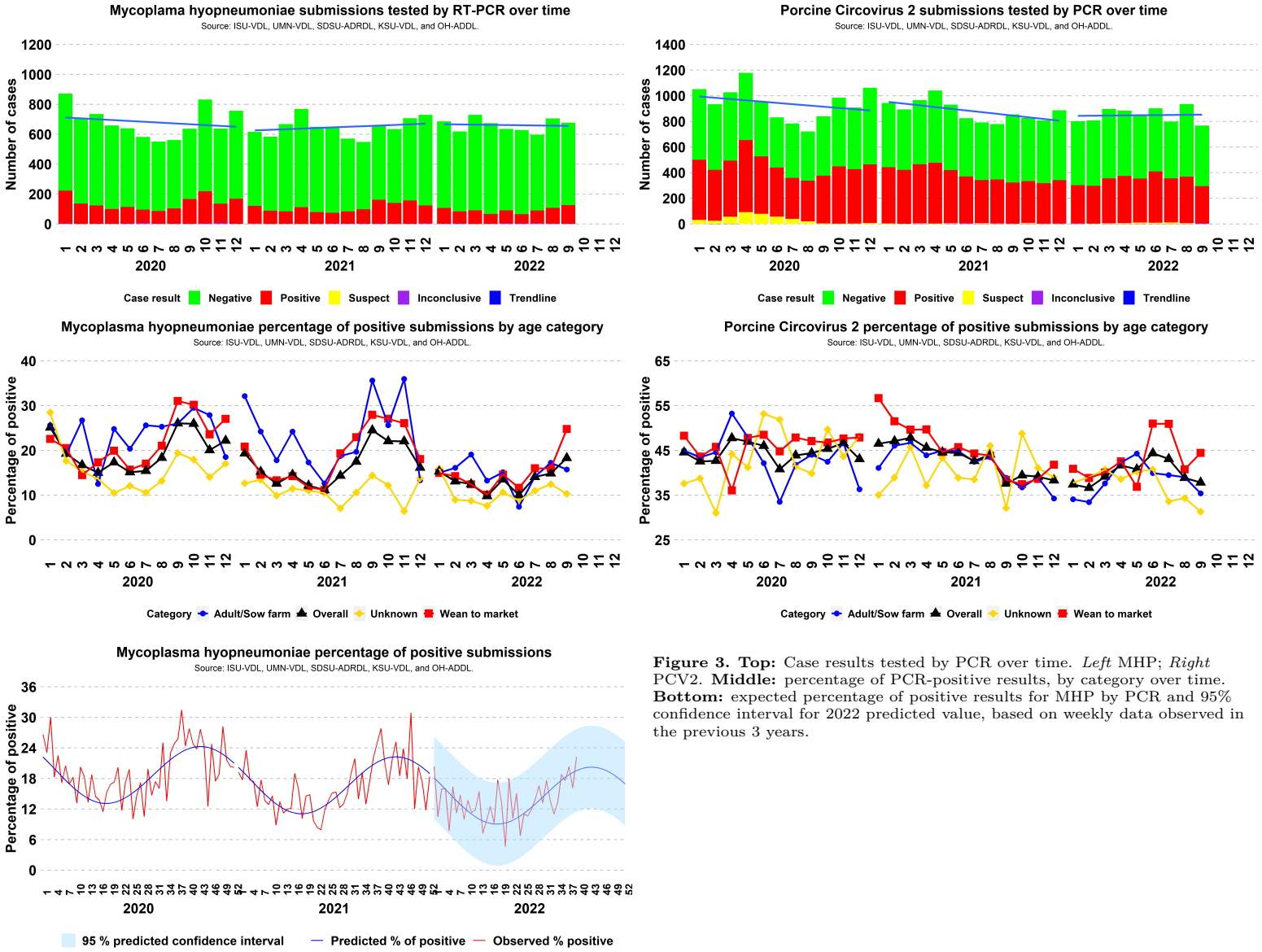
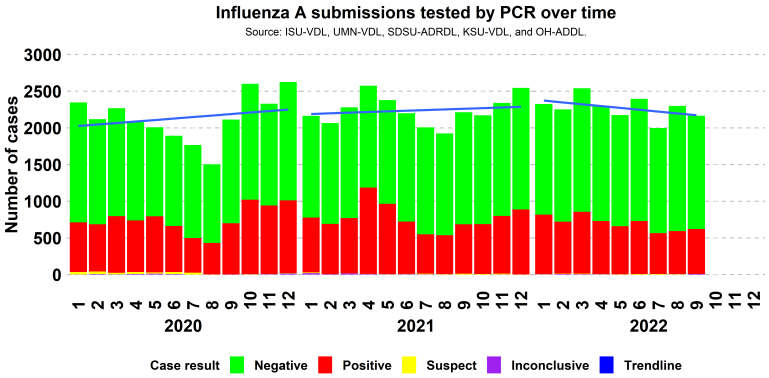


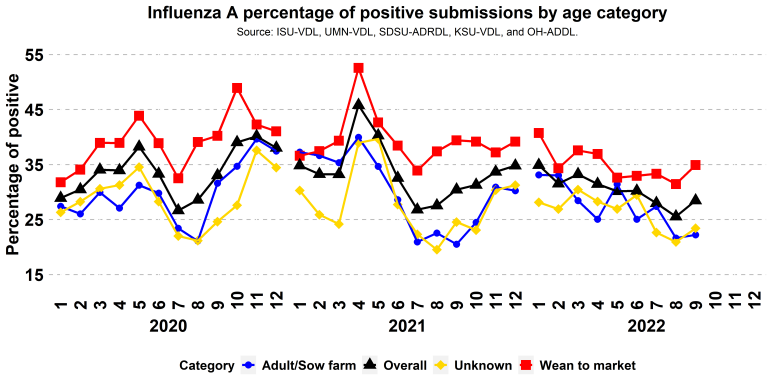
Figure 3. Top: Case results tested by PCR over time. *Left* MHP; *Right* PCV2. **Middle:** percentage of PCR-positive results, by category over time. **Bottom:** expected percentage of positive results for MHP by PCR and 95% confidence interval for 2022 predicted value, based on weekly data observed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

SDRS Advisory Group highlights:

- Overall, 18.32% of 677 cases tested *M. hyopneumoniae*-positive cases in September, similar to 14.87% of 706 in August;
  - Positivity in the adult/sow category in September was 15.75% (20 of 127), similar to 17.24% (20 of 116) in August;
  - Positivity in the wean-to-market category in September was 24.77% (81 of 327), a substantial increase from 16% (52 of 325) in August;
  - Overall MHP-percentage of positive was within state-specific baselines in all 11 monitored states;
- Overall, 37.84% of 761 cases tested PCV2-positive in September, similar to 38.87% of 934 in August;
  - Positivity in the adult/sow category in September was 35.4% (154 of 435),a moderate decrease from 39.04% (171 of 438) in August;
  - Positivity in the wean-to-market category in September was 44.44% (108 of 243), a moderate increase from 40.77% (137 of 336) in August.
- The advisory group highlighted that most of these cases of *Mycoplasma hyopneumoniae* occurring in the field are part of the porcine respiratory disease complex (PRDC), and are often associated with PRRSV activity in the wean-to-market category, opening doors for other agents such as PCV2, the Mycoplasmas, and Influenza A virus.

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





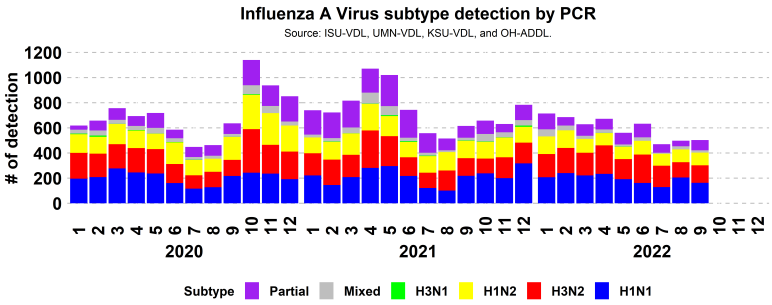
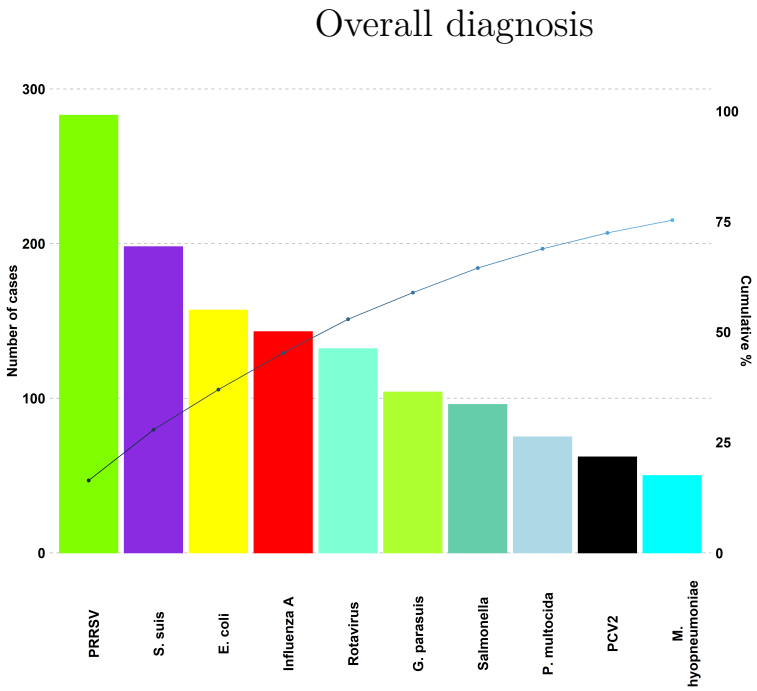


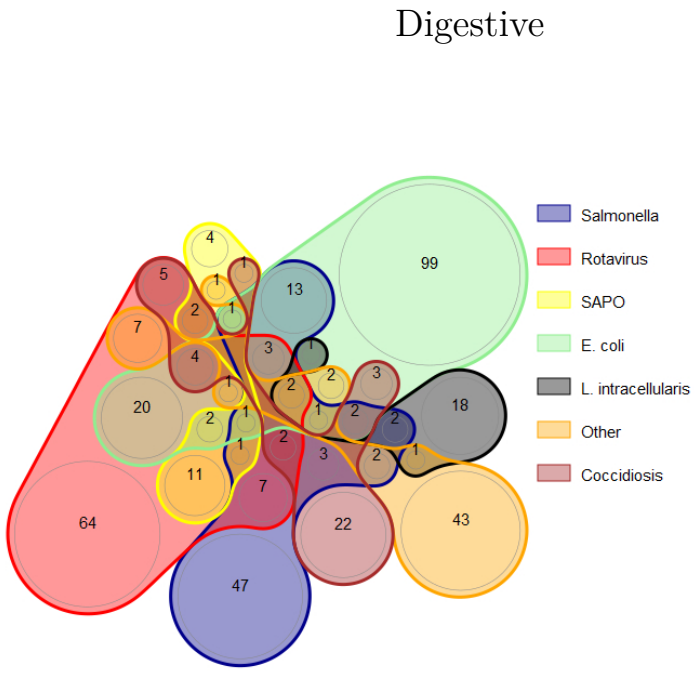
Figure 3. Top: *Left* Results of IAV PCR cases over time. *Right* Percentage of IAV PCR-positive results, by category over time. **Bottom:** Number of IAV subtyping PCR detection over time; (Partial - only hemagglutinin or neuraminidase region detected; Mixed - 3 or more haemagglutinin and neuroaminidase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

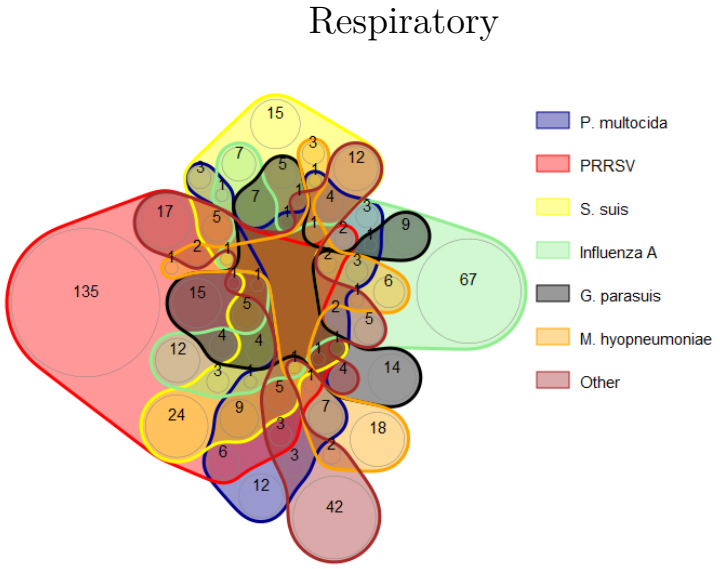
SDRS Advisory Group highlights:

- Overall, 28.46% of 2,161 cases tested IAV-positive cases in September, a moderate increase from 25.54% of 2,298 in August;
  - Positivity in the adult/sow category in September was 22.22% (82 of 369), similar to 21.64% (95 of 439) in August;
  - Positivity in the wean-to-market category in September was 34.91% (340 of 974), a moderate increase from 31.45% (307 of 976) in August.
- Overall, 3.78% of 503 samples were mixed subtype detection in September, similar to 4.82% of 498 in August;
- The advisory group highlighted that multiple IAV strains are circulating in the production systems. Monitoring of IAV is mainly performed when clinical signs are present or for vaccine updates. The producers implementing routine monitoring for IAV do mainly using oral fluids collected from multiple sites to update vaccine strategy and monitor porcine respiratory disease complex cases.

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







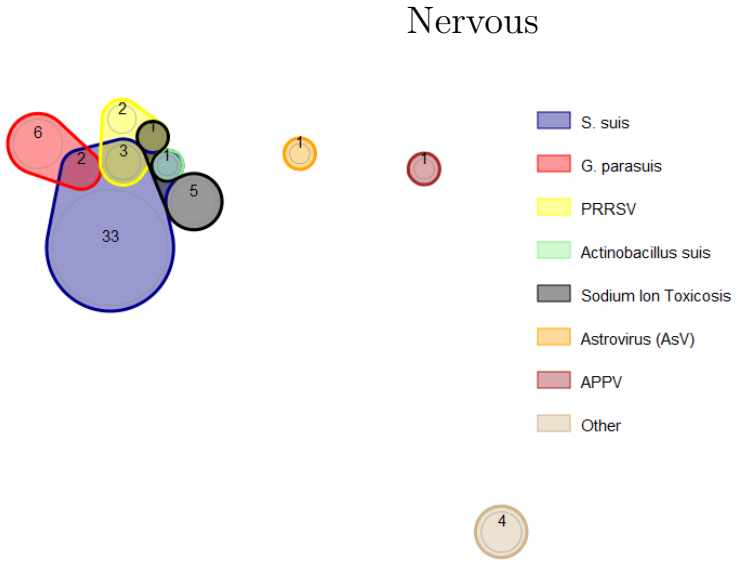


Figure 4. ISU-VDL most frequent overall confirmed tissue disease diagnosis. The presented system is described in the title of the chart. Colors represent one agent; line intersections present diagnosis of 2 or more agents within a submission. Only the most frequent etiology/disease are presented. Less 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, 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 August. 1 to September. 21, 2022.

SDRS Advisory Group highlights:

- PRRSV (283) led cases with confirmed etiology, followed by *S. suis* (198), and *E. coli* (157). PRRSV (262 of 843) led the number of confirmed respiratory diagnoses, *E. coli* (155 of 525) lead the number of confirmed digestive diagnoses, and *S. suis* (39 of 66) led the number of confirmed neurological diagnoses;
- During the weeks of August 29 and September 12 there were small spikes in tissue diagnosis of *Pasteurella multocida* cases;

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.*

Highlights from Influenza A subtyping PCR detection

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1 - Swine Disease Reporting System office, Ames, Iowa, USA.

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. After a request from our Advisory Board, the SDRS brings onboard information for Influenza A subtyping detection by PCR. The subtyping information provides megatrends of subtyping detections per month over the years. Since 2020, H1N1 has been the main subtype detected by PCR (29,64%) followed by H3N2 (26.39%) and H1N2 (21.03%). Also, the SDRS reports will highlight the number of mixed detection, which is a informs the number of multiple subtypes being detected by a PCR in one single sample. Historical data was fully incorporated, and a new chart under Influenza A virus report page, will bring monthly updates about Influenza A virus subtype detection. Dynamic dashboards with the capability of filtering the data over time, age category, and specimen are also available on the SDRS webpage under the Influenza A Virus. Dashboards are also available on the SDRS webpage under the *Influenza A Virus* The major highlights for IAV subtype detection are:

Influenza A subtype detection by PCR (Figure 1)

- In 2022, H1N1 is the most detected IAV subtype (32,32%) followed by H3N2 (30,56%), and H1N2 (18,37%).
- Months with increased number of IAV subtype PCR detection have an increased in the number of mixed detection.
- 67% of the mixed detection are detected in population based samples (majority detected in oral fluids) and 33% are detected in individual samples (majority detected in lung tissues).

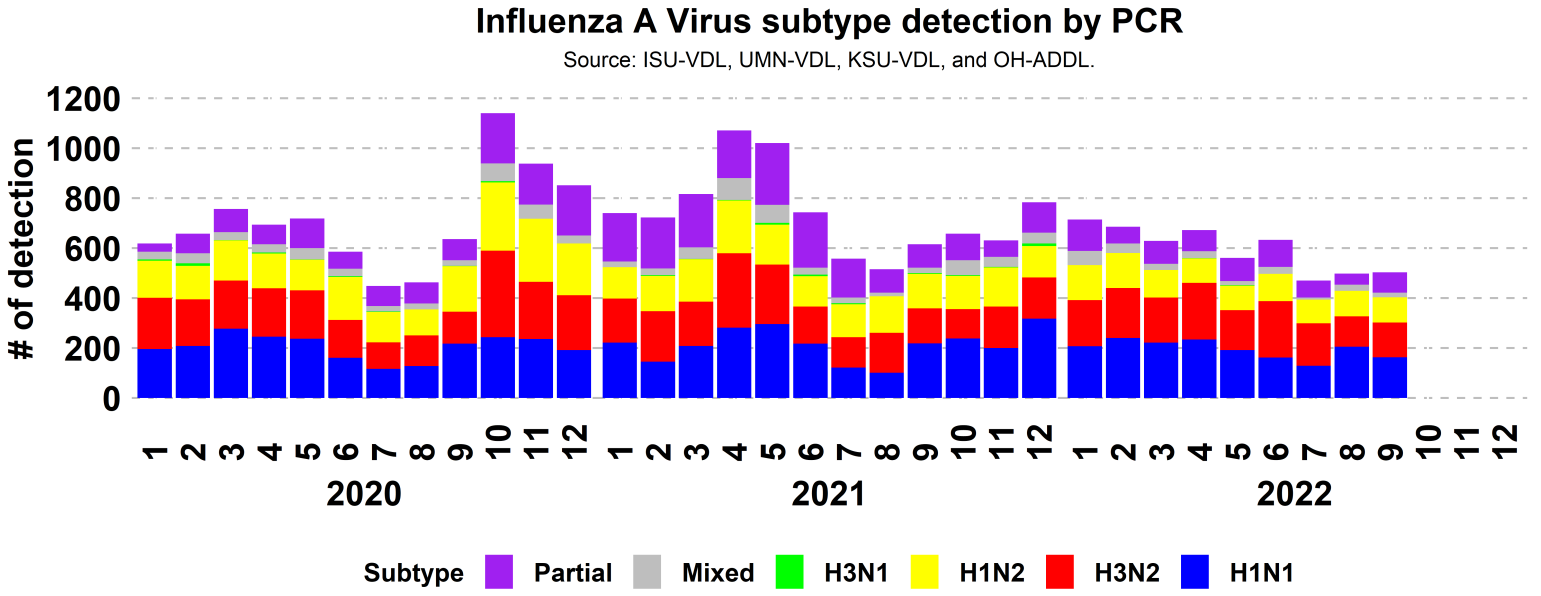

Figure 1: Detection of IAV subtype by PCR. The colors represent each subtype. Partial detection represents when only hemagglutinin or neuraminidase region is detected by PCR in a sample. Mixed detection represents 3 or more hemagglutinin and neuraminidase regions detected. i.e., "H1 H3 N1".