Swine Disease Reporting System
Report # 50 (April 5, 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 the input of our advisory group, which consists of veterinarians and producers across the USA 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 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, and Kansas State University VDL.

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, Pablo Pineyro, 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 Diagnostic Lab.: Melanie Prarat, William Hennessy, Yan Zhang, 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, USA state, specimen, and age group.

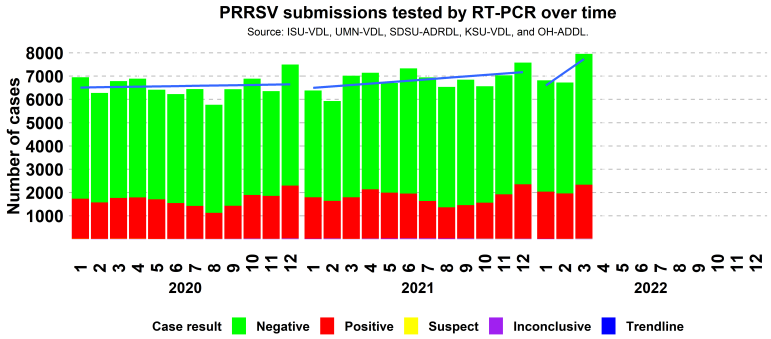
Audio and video reports: Key findings from SDRS projects are summarized monthly in a conversation between investigators, and available in the form of an "audio report", and "video report" through SwineCast, YouTube, LinkedIn, and the SDRS webpage.

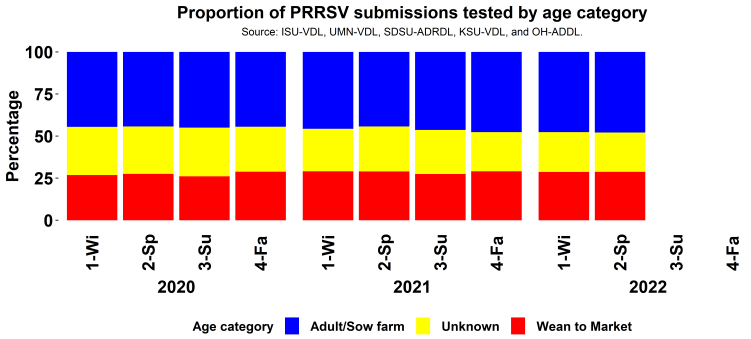
Advisory Group: Reviews and discusses the data, providing their comments and perspectives monthly: Mark Schwartz, Paul Sundberg, Paul Yeske, Tara Donovan, Deborah Murray, Scott Dee, Melissa Hensch, Brigitte Mason, Peter Schneider, Sam Copeland, Luc Dufresne, and Daniel Boykin.

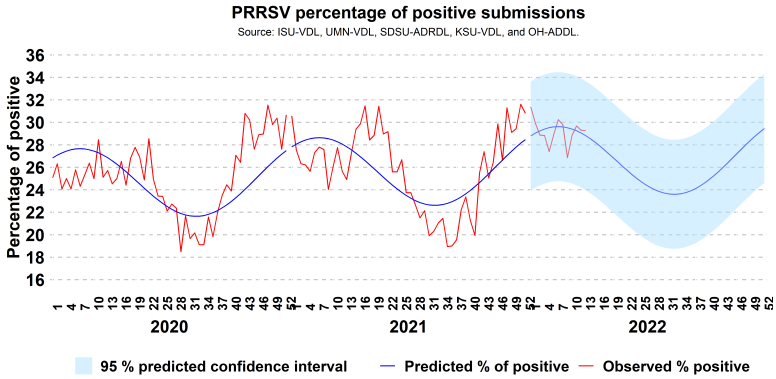
In addition to this report, interactive dashboards with aggregated test results are available at www.fieldepi.org/SDRS.

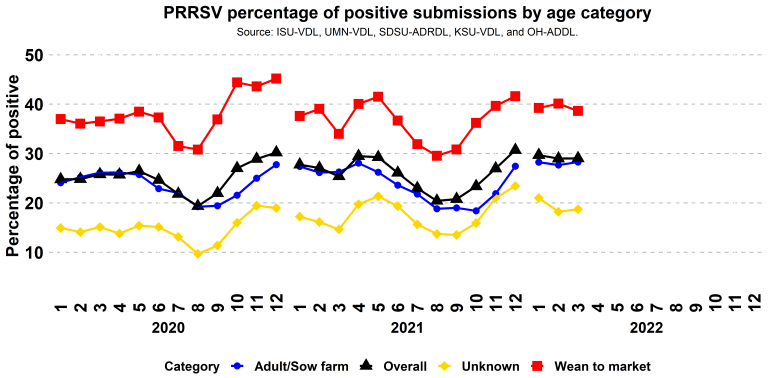
Note: This report contains data up to March 31, 2022.

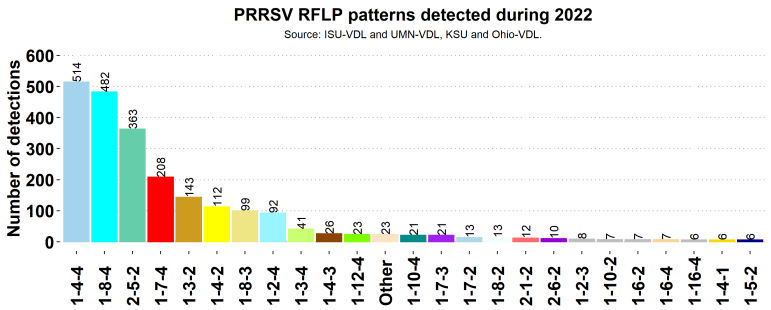
Topic 1 – Detection of PRRSV RNA over time by RT-qPCR.











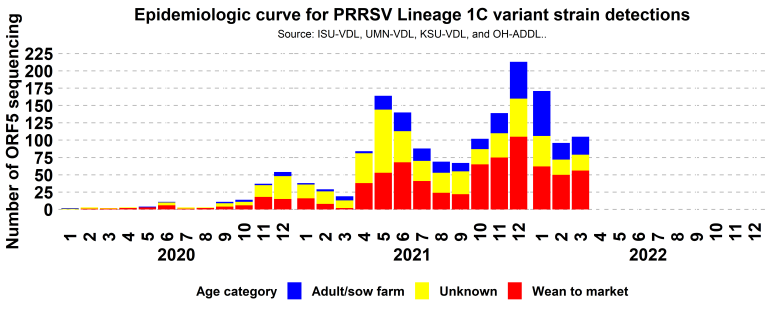


Figure 1. Top: *left*: Results of PRRSV RT-PCR cases over time. *Right*: Proportion of accession ID cases tested for PRRSV by age group per year and season. **Middle**: *Left* expected percentage of positive results for PRRSV RNA by RT-qPCR, with 95% confidence interval band for predicted results based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

SDRS Advisory Group highlights:

- Overall, 29.03% of 7,958 cases tested PRRSV-positive in March, similar to 28.99% of 6,723 in February;
  - Positivity in adult/sow category in March was 28.28% (1,078 of 3,812), similar to 27.68% (889 of 3,212) in February;
  - Positivity in wean-to-market category in March was 38.64% (884 of 2,288), similar to 40.13% (770 of 1,919) in February;
  - Overall PRRSV-percentage of positive cases was 3 standard deviations from state-specific baselines in NE, MO, IL, and IN;
- The advisory group highlighted that the regional increase in detection of PRRSV is aligned with field observations of more activity of PRRS in those areas with no significant major cause identified. The advisory group reminds us to keep working in improving biosecurity practices in breeding and especially in growing sites. Strategic usage of PRRSV vaccination of growing pigs and pig placement could be potential tools to help contain the spread of PRRSV and reduce the odds of a new spring wave of PRRSV activity as seen in 2021.

Topic 2 – Enteric coronavirus RNA detection by RT-qPCR

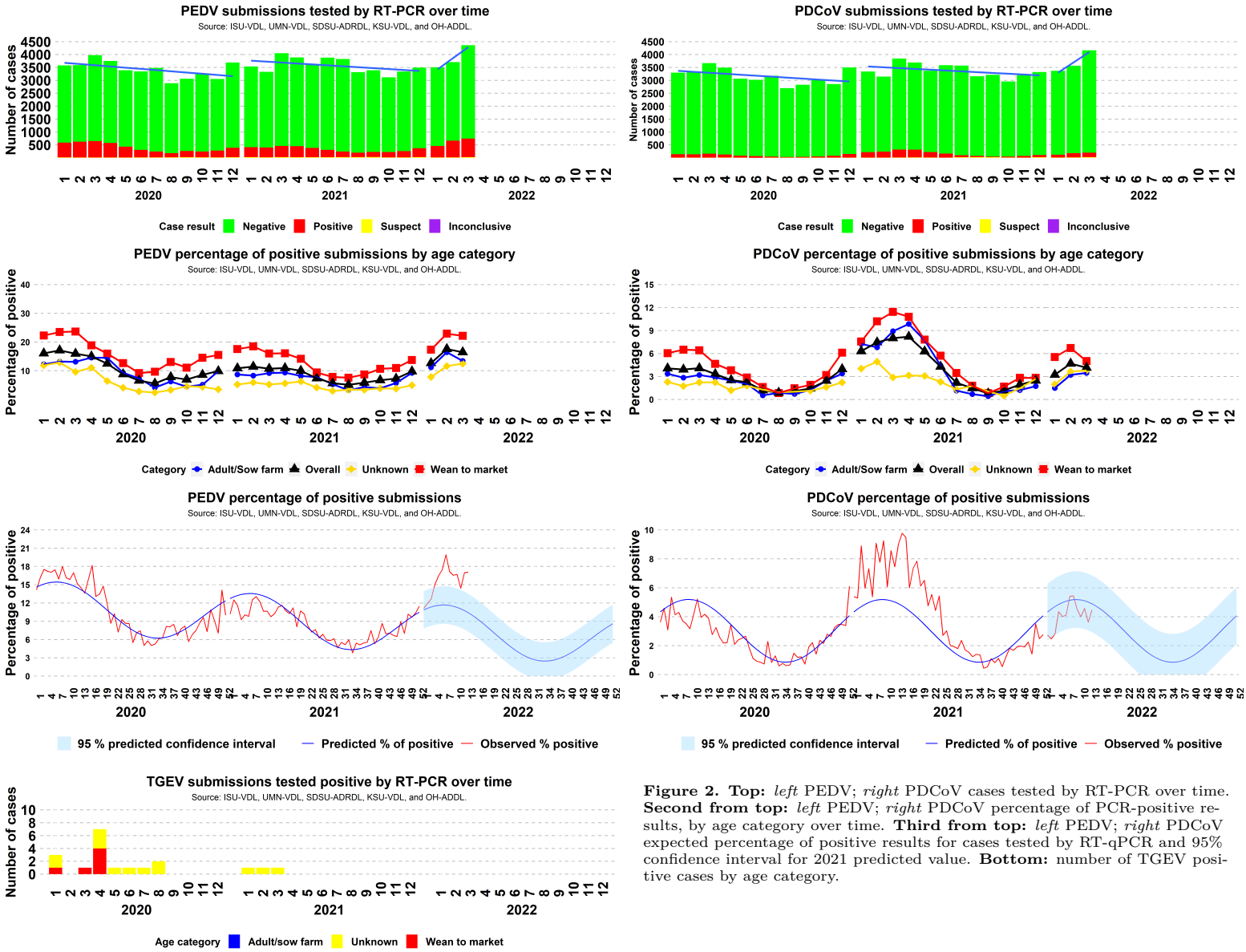


Figure 2. Top: *left* PEDV; *right* PDCoV cases tested by RT-PCR over time. **Second from top:** *left* PEDV; *right* PDCoV percentage of PCR-positive results, by age category over time. **Third from top:** *left* PEDV; *right* PDCoV expected percentage of positive results for cases tested by RT-qPCR and 95% confidence interval for 2021 predicted value. **Bottom:** number of TGEV positive cases by age category.

SDRS Advisory Group highlights:

- Overall, 16.48% of 4,364 cases tested PEDV-positive in March, similar to 17.58% of 3,708 in February;
- Positivity in adult/sow category in March was 13.45% (193 of 1,435), a moderate decrease from 16.48% (202 of 1,226) in February;
- Positivity in wean-to-market category in March was 22.16% (367 of 1,656), similar to 22.93% (327 of 1,426) in February;
- The overall PEDV-percentage of positive cases was 3 standard deviations from state-specific baselines in NE, OK, and IA;
- Overall, 4.15% of 4,164 cases tested PDCoV-positive in March, similar to 4.68% of 3,567 in February;
- Positivity in adult/sow category in March was 3.47% (47 of 1,354), similar to 3.21% (38 of 1,184) in February;
- Positivity in wean-to-market category in March was 5.01% (80 of 1,596), similar to 6.73% (92 of 1,368) in February;
- Overall PDCoV-percentage of positive cases was within state-specific baselines in all 10 monitored states;
- There was 0 positive case for TGEV RNA in March, 2022 over a total of 4,051 cases tested;
- **During the last 12 months there was 0 positive cases for TGEV RNA over a total of 39,888 cases tested;**
- The advisory group highlighted that PEDV winter outbreaks are expected and that the 2022 increased activity of PEDV was associated with the opportunity of virus spread across production site connections as caretakers, feed, and animal carriers which reinforces the importance of biosecurity and biocontainment measures. Also, it was pointed out that the industry could consider the decreased activity of this virus during summer months to work towards herd elimination with the potential to take to pursue in the future an integrated national level elimination approach.

Topic 3 – Detection of *Mycoplasma hyopneumoniae* (MHP) DNA by PCR.

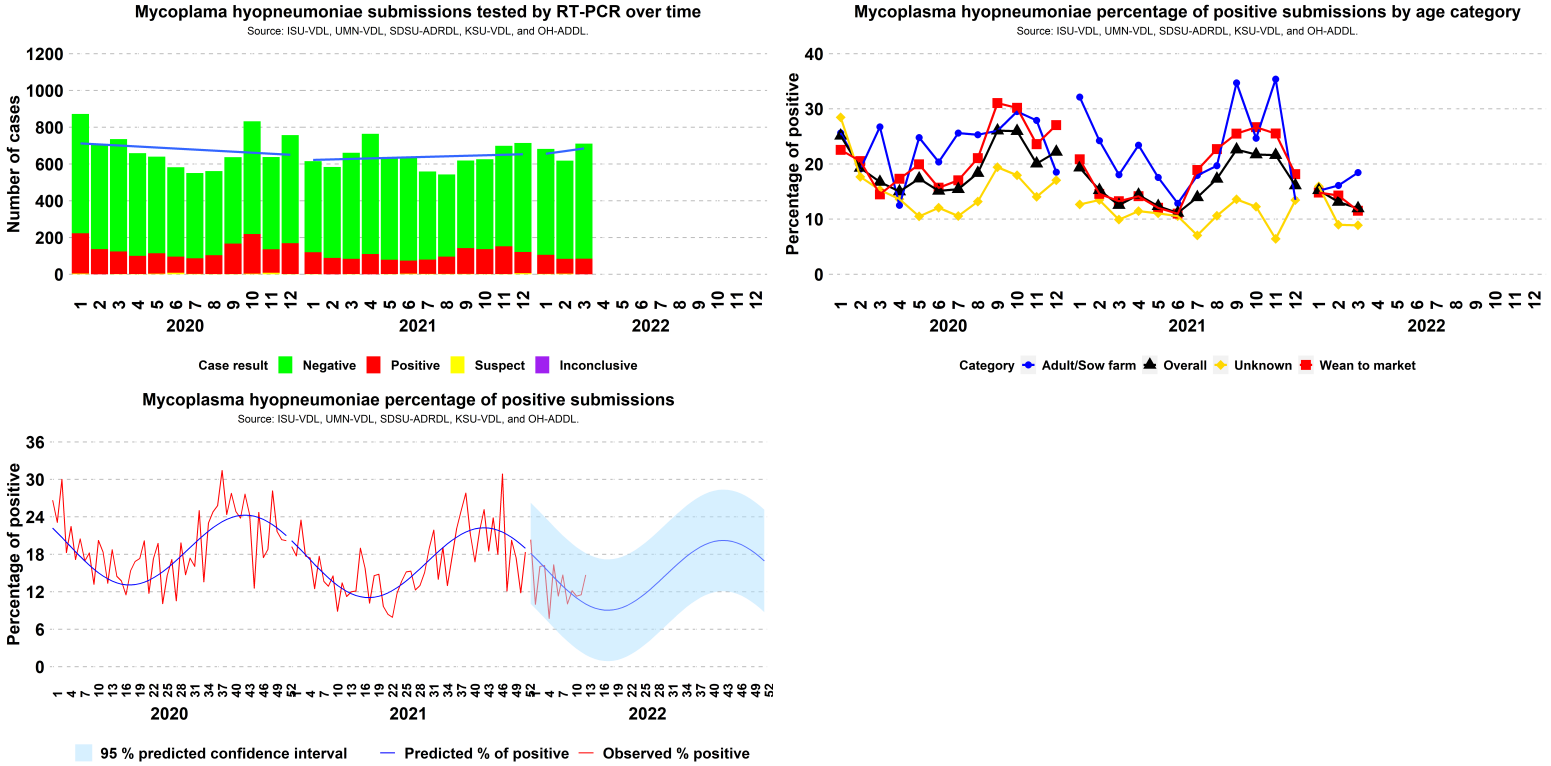


Figure 3. *Left top*: results of *M. hyopneumoniae* (MHP) PCR cases over time. *Right top*: percentage of MHP PCR-positive results, by category over time. *Bottom*: expected percentage of positive results for MHP by PCR and 95% confidence interval for 2022 predicted value, based on weekly data observed in the previous 3 years.

SDRS Advisory Group highlights:

- Overall, 11.95% of 711 cases tested *M. hyopneumoniae*-positive cases in March, similar to 13.11% of 618 in February;
  - Positivity in adult/sow category in March was 18.46% (24 of 130), a moderate increase from 16.1% (19 of 118) in February;
  - Positivity in wean-to-market category in March was 11.52% (41 of 356), a moderate decrease from 14.29% (46 of 322) in February;
  - Overall MHP-percentage of positive was within state-specific baselines in all 11 monitored states;

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

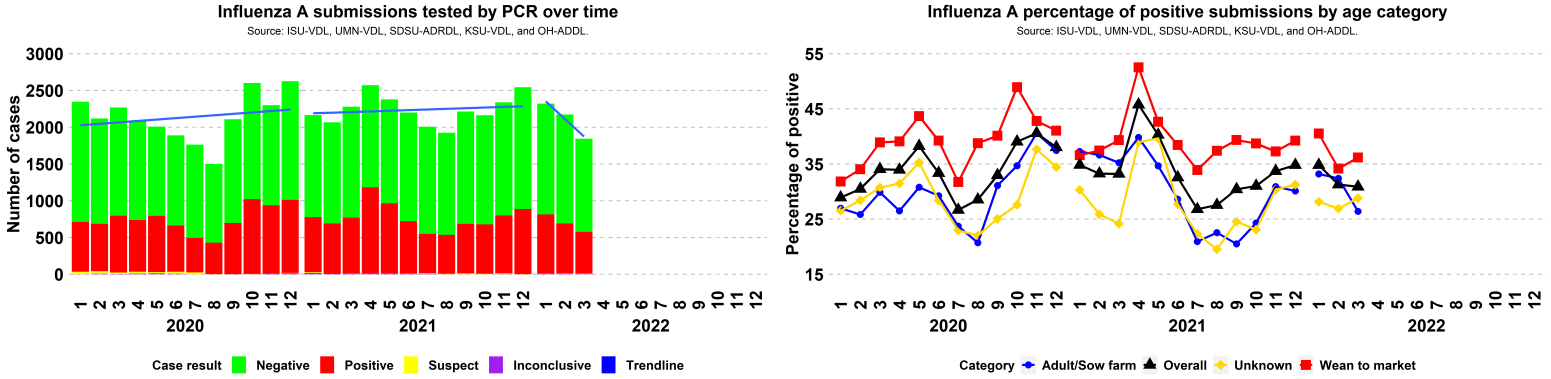
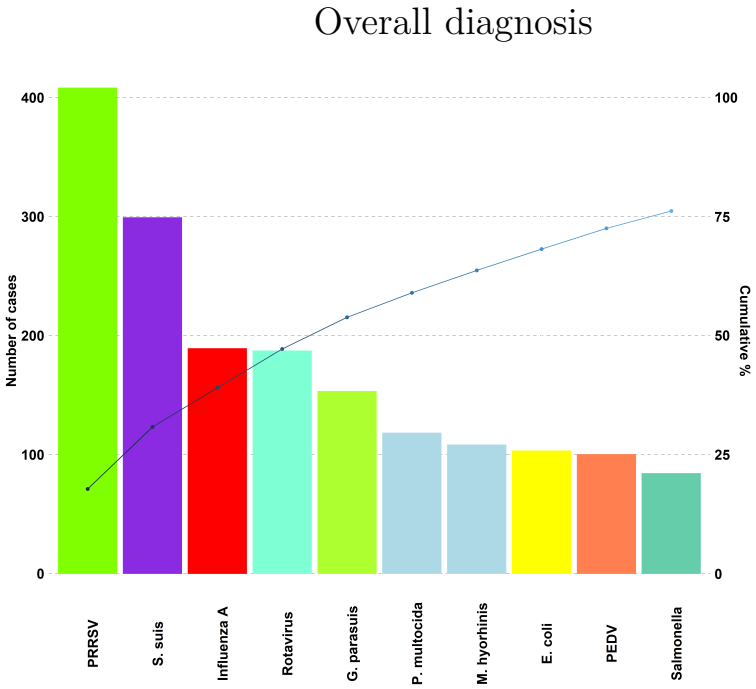


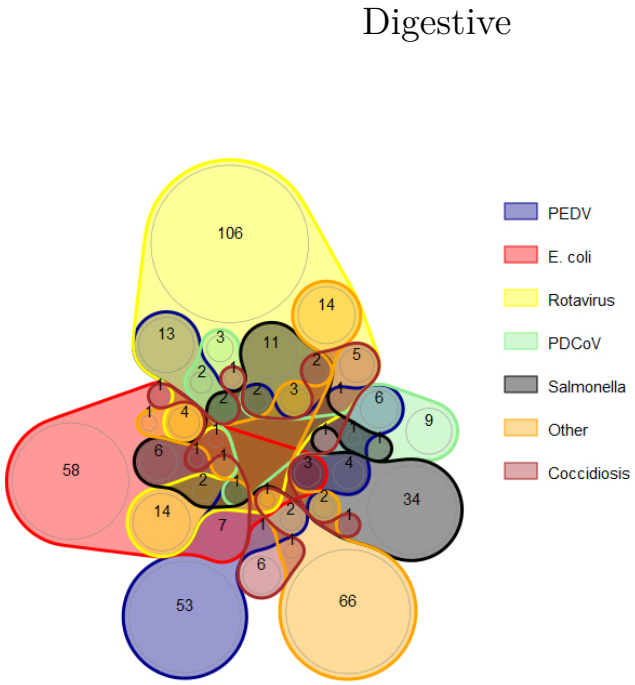
Figure 3. *Left*: results of IAV PCR cases over time. *Right*: percentage of IAV PCR-positive results, by category over time.

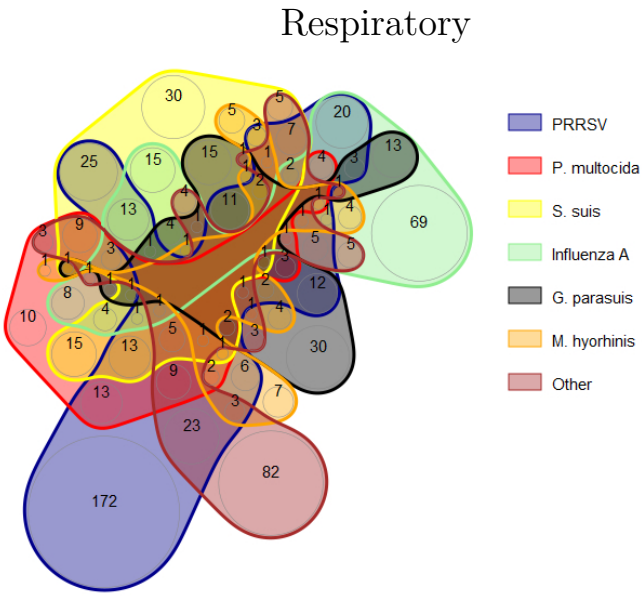
SDRS Advisory Group highlights:

- Overall, 30.87% of 1,840 cases tested IAV-positive cases in March, similar to 31.27% of 2,168 in February;
  - Positivity in adult/sow category in March was 26.41% (89 of 337), a substantial decrease from 32.4% (139 of 429) in February;
  - Positivity in wean-to-market category in March was 36.17% (221 of 611), a moderate increase from 34.17% (327 of 957) in February;
- The advisory group highlighted that:
  - The bi-seasonal Influenza A virus detection pattern has been seen throughout the years and aligns with field observations;
  - Environmental stressors such as fluctuation in temperatures, challenges with ventilation, and manure pumping seasons have been consistently associated with Influenza A outbreaks;
  - Potentially naïve pig flow at the end of winter and summer may help ignite the high activity observed during spring and fall periods contributing to additional Influenza A outbreaks;
  - The higher positivity in the wean-to-finish category compared with adult/sow farms is aligned with field observations and is contributed by environmental stressors and co-factors, lateral infection, and lack of immunity. On the other hand, breeding animals are better prepared with the usage of vaccines, and maternal immunity helps to fewer clinical signs and, therefore, are less tested and have lower positivity.

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







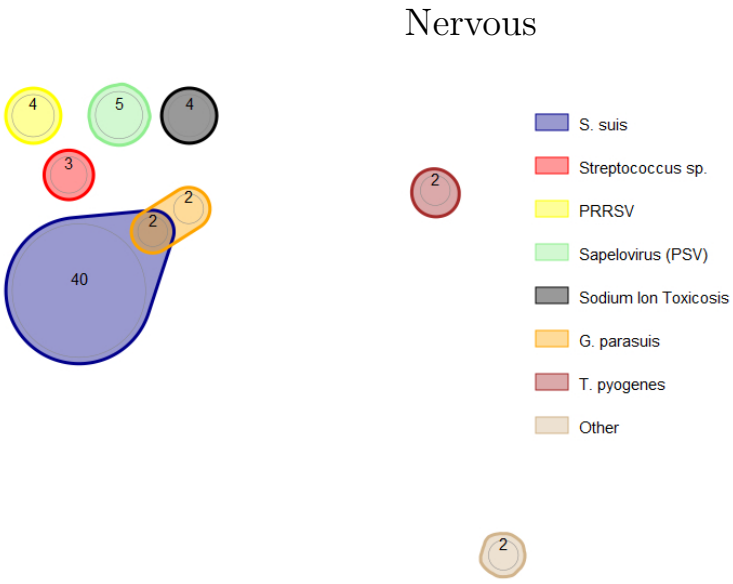


Figure 4. ISU-VDL most frequent overall confirmed tissue disease diagnosis. The presented system is described in the title of the chart. Colors represent one agent. Line intersections present diagnosis of 2 or more agents within a submission. Only the most frequent etiology/disease are presented. Less 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 Feb. 1 to Mar. 19, 2022.

SDRS Advisory Group highlights:

- PRRSV (408) led cases with confirmed etiology, followed by *S. suis* (299), and Influenza A (189). PRRSV (372 of 1232) led the number of confirmed respiratory diagnoses, Rotavirus (187 of 613) lead the number of confirmed digestive diagnoses, and *S. suis* (42 of 66) led the number of confirmed neurological diagnosis;
- During the week of March 07, there was a small spike in tissue diagnosis of PED 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.*

Information for Swine Influenza A Virus (IAV) RT-PCR detection from porcine cases is now available on the monthly PDF reports and online SDRS dashboards

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

The Swine Disease Reporting System (SDRS) has the goal 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. Our stakeholders have requested, and SDRS is excited to bring onboard information for Influenza A virus (IAV) RNA detection by RT-PCR from porcine cases. Historical data was fully incorporated, and a new page starting on SDRS report # 50 will bring monthly updates about IAV detection. Dashboards are also avaliable in the SDRS webpage under the *Influenza A Virus dashboard*. It will also incorporate data for IAV PCR subtyping detection in a short time. The major highlights for IAV detection are:

Number of cases tested and percentage of positive submissions (Figure 1)

- The number of submissions tested for IAV has considerably increased from 252/month in 2009 to 2,244/month in 2021;
- A bi-seasonal pattern of IAV detection has been identified with spikes in detection during the spring and fall months;
- The years 2014 and 2018 had an anticipated spike in IAV detection that occurred during the winter months.

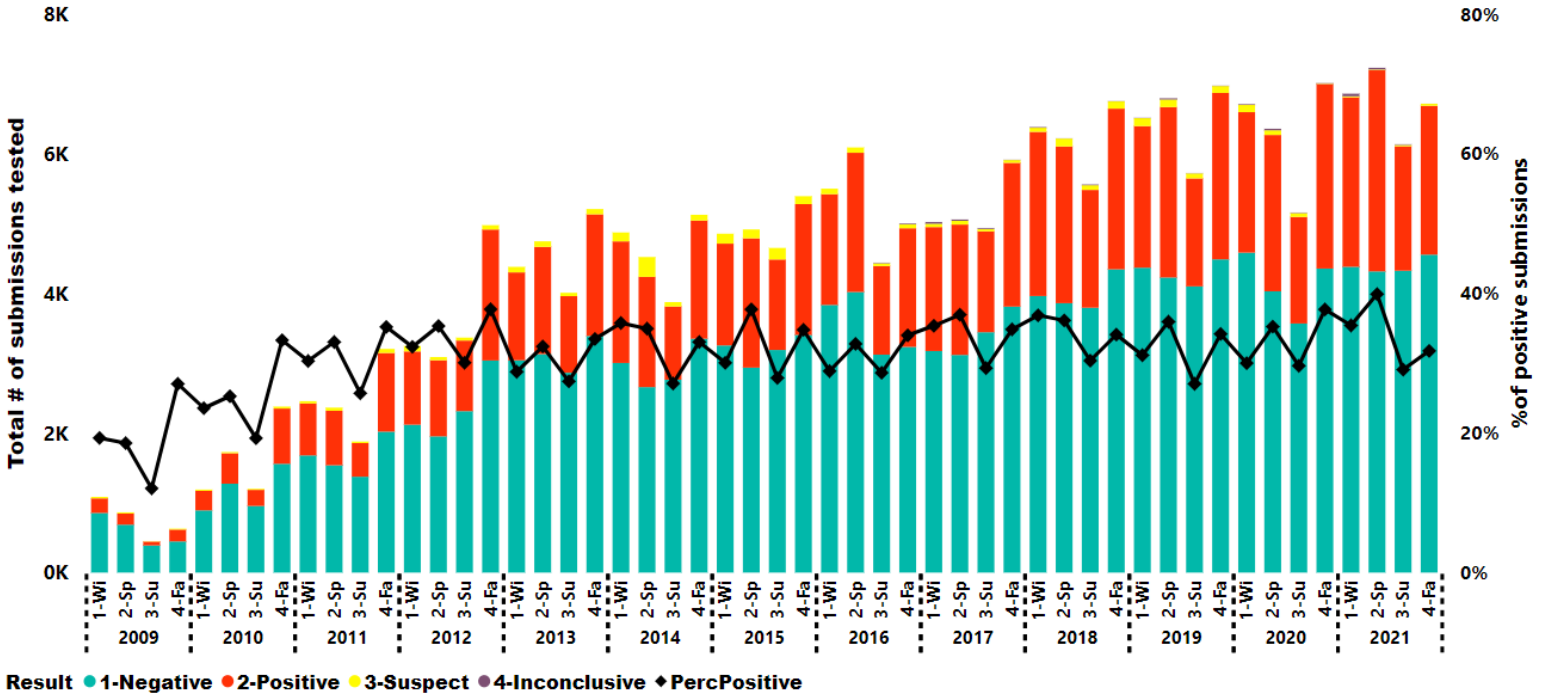

Figure 1: Number of submissions tested for Influenza A Virus RNA by RT-PCR RNA and percentage of positive submissions.

Percentage of positive submissions by age category (Figure 2)

- Wean to market submissions have a higher rate of percentage of positivity than submissions coming from adult/sow farm;
- Similar to PRRSV, there is a preceding increase in detection of IAV in the age category wean to market that occurs about a month before increases detection the age category adult/sow farm.

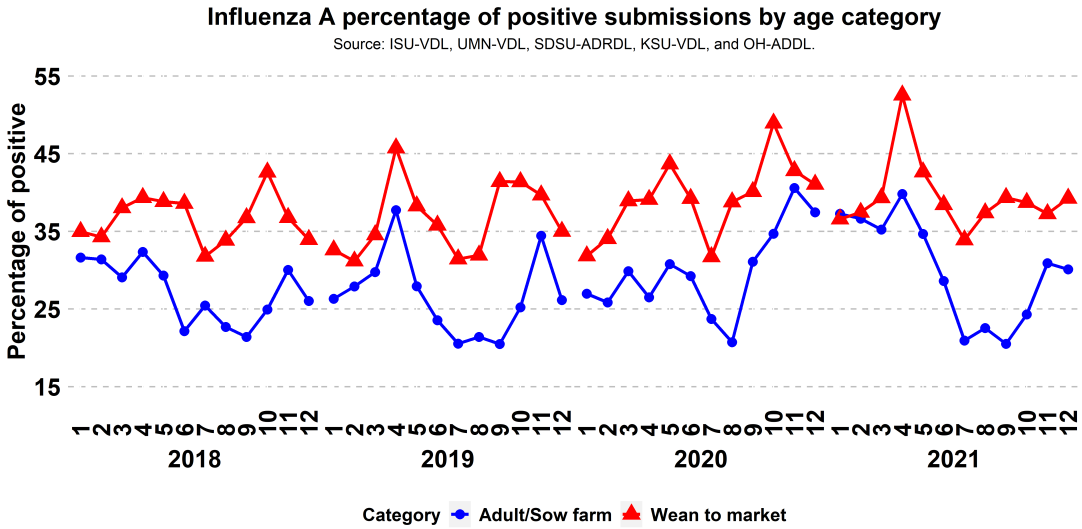

Figure 2: Percentage of positive submissions by month for the age categories adult/sow farm and wean to market.

Specimens used for IAV RT-PCR testing (Figure 3)

- Lung samples are the most prevalent tissue used for IAV RT-PCR testing;
- IAV testing using oral fluid samples has considerably increased after 2009 and is currently the specimen more frequently used for IAV RT-PCR testing.

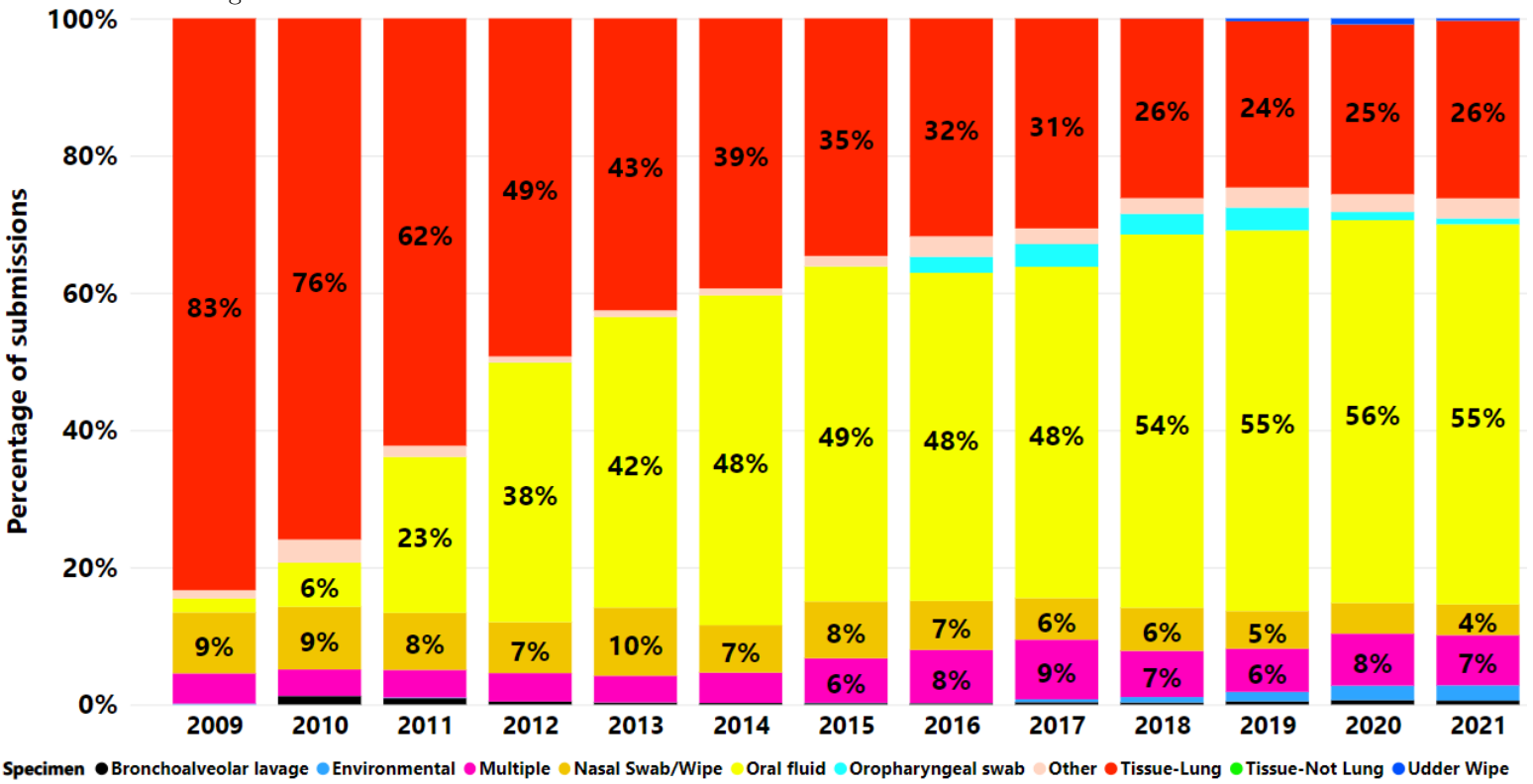

Figure 3: Percentage of submissions by specimens tested for Influenza A Virus by RT-PCR over time.