

Swine Disease Reporting System

Report # 40 (June 1, 2021)

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:

Iowa State University: Giovani Trevisan, Edison Magalhães, Bret Crim, Poonam Dubey, Kent Schwartz, Eric Burrough, Phillip Gauger, Pablo Pineyro, Christopher Siepker; Rodger Main, Daniel Linhares.

Project coordinator [Giovani Trevisan](#). Principal investigator [Daniel Linhares](#).

University of Minnesota: Mary Thurn, Paulo Lages, Cesar Corzo, Jerry Torrison.

Kansas State University: Rob McGaughey, Eric Herrman, Roman Pogranichniy, Rachel Palinski, Jamie Henningson.

South Dakota State University: Jon Greseth, Darren Kersey, Travis Clement, Jane Christopher-Hennings.

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 report: Benchmarks patterns of PRRSV RFLP pattern detected at the ISU-VDL and UMN-VDL 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 on a monthly: Mark Schwartz, Paul Yeske, Tara Donovan, Deborah Murray, Scott Dee, Melissa Hensch, Brigitte Mason, Peter Schneider, and Sam Copeland.

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, 2021.

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

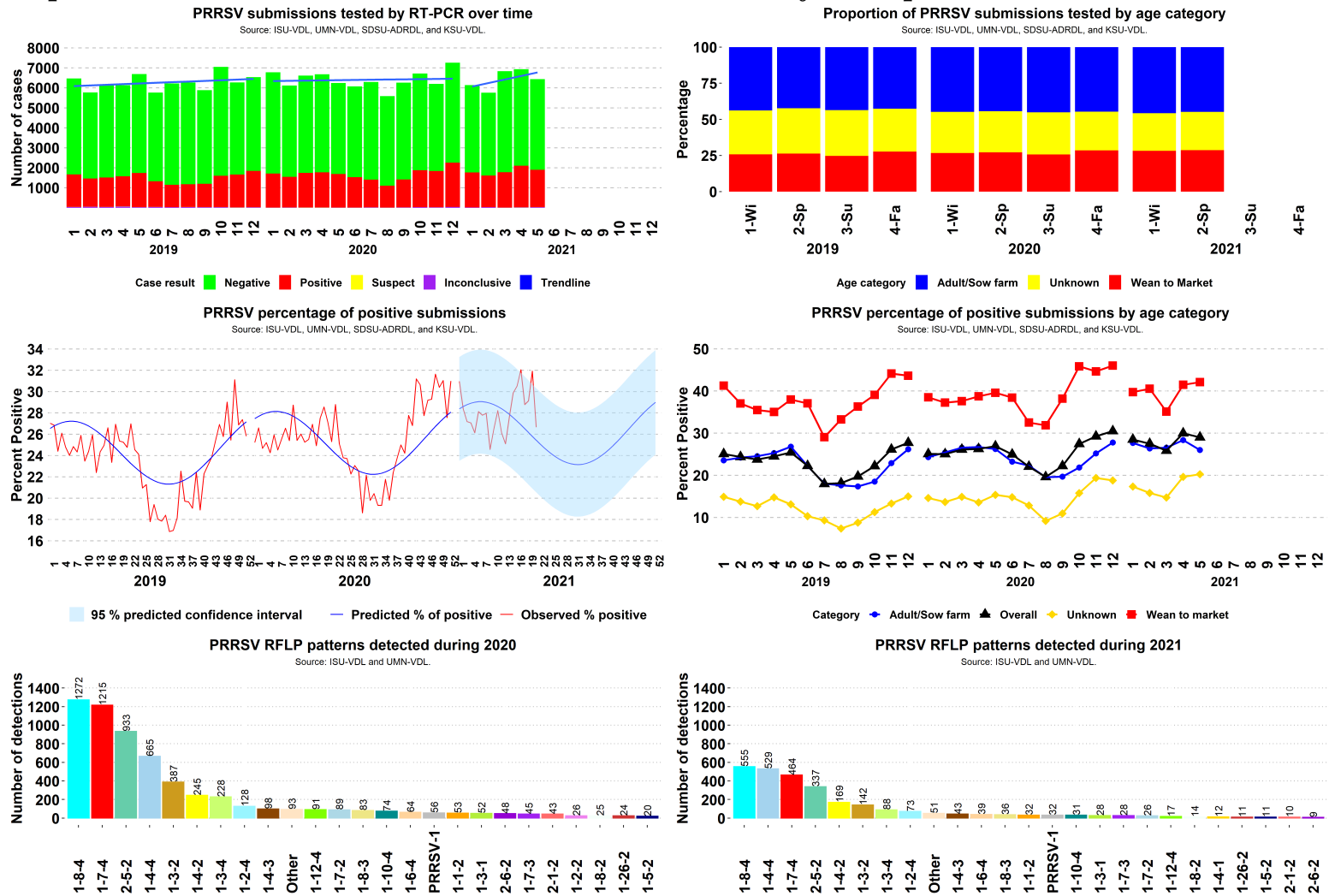


Figure 1. Top: left: Results of PRRSV RT-PCR cases over time. Right: Proportion of accession ID cases tested for PRRSV by age group per year and season. Middle: Left expected percentage of positive results for PRRSV RNA by RT-qPCR, with 95% confidence interval band for predicted results based on weekly 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 the 25 most frequently detected RFLP patterns left year of 2020; right year of 2021.

SDRS Advisory Group highlights:

- Overall, 29.01% of 6,436 cases tested PRRSV-positive in May, similar to 29.97% of 6,936 in April;
 - The overall PRRSV detection was above the forecasted levels for the week of April 26 - May 2;
 - Positivity in adult/sow category in May was 26% (746 of 2,869), a moderate decrease from 28.37% (864 of 3,046) in April;
 - Positivity in wean-to-market category in May was 42.11% (768 of 1,824), similar to 41.48% (857 of 2,066) in April;
 - Overall PRRSV-percentage of positive cases was 3 standard deviations from state-specific baselines NE and OH;
- The advisory group pointed that different PRRSV strains at different regions are keeping PRRSV activity at high levels;
- After a couple months of relatively quiet activity in sow farms, the RFLP 1-4-4 L1C variant strain has increased activity in all age groups;
 - Different PRRSV strains have been reported in sow farm outbreaks in NE and OH;
 - The grow-finish pig population is an import source of PRRSV, testing at high positivity (42.11%) and contributing to virus spread to all age groups.

Topic 2 – Detection of RNA of enteric coronavirus by RT-qPCR

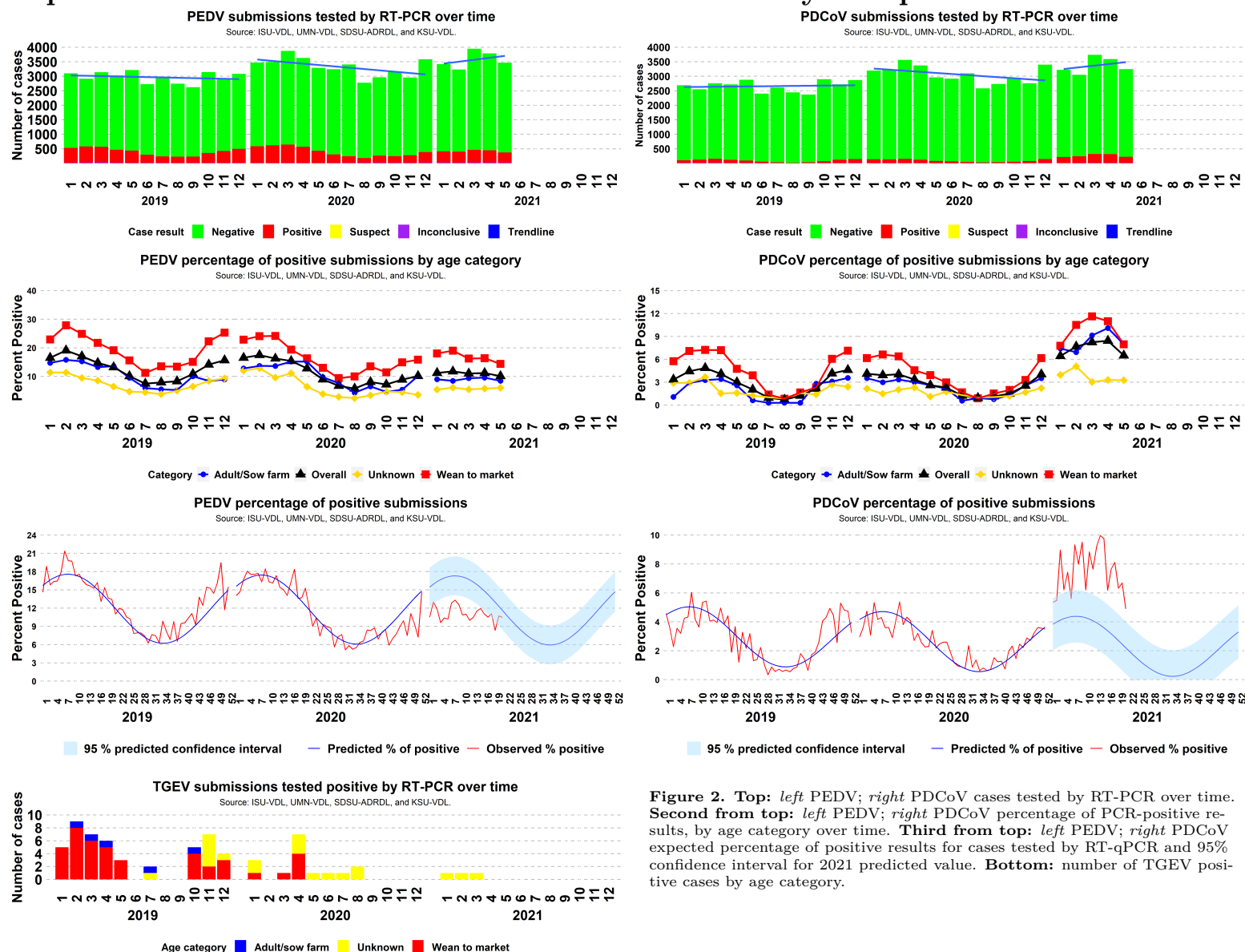


Figure 2. Top: left PEDV; right PDCoV cases tested by RT-PCR over time. Second from top: left PEDV; right PDCoV percentage of PCR-positive results, by age category over time. Third from top: left PEDV; right PDCoV expected percentage of positive results for cases tested by RT-qPCR and 95% confidence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

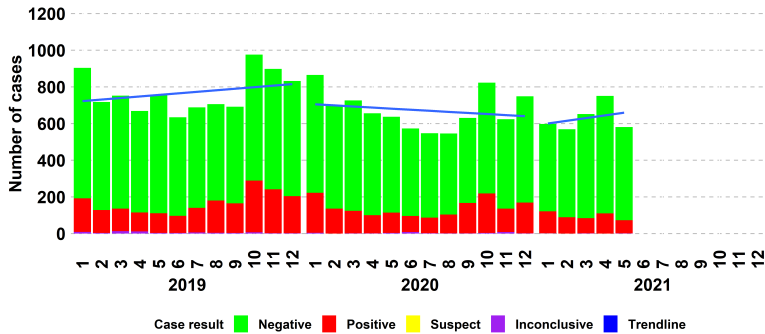
SDRS Advisory Group highlights:

- Overall, 10.12% of 3,468 cases tested PEDV-positive in May, similar to 11.21% of 3,790 in April;
 - Positivity in adult/sow category in May was 8.46% (86 of 1,017), similar to 9.56% (112 of 1,171) in April;
 - Positivity in wean-to-market category in May was 14.39% (202 of 1,404), similar to 16.37% (250 of 1,527) in April;
 - The overall PEDV-percentage of positive cases was 3 standard deviations from state-specific baselines in IL;
- Overall, 6.5% of 3,247 cases tested PDCoV-positive in May, similar to 8.44% of 3,592 in April;
 - The overall PDCoV detection was outside of the upper boundaries of the forecasted levels since January;
 - Positivity in adult/sow category in May was 7.97% (76 of 954), a moderate decrease from 10.1% (112 of 1,109) in April;
 - Positivity in wean-to-market category in May was 7.97% (102 of 1,280), a moderate decrease from 10.99% (156 of 1,419) in April;
 - Overall PDCoV-percentage of positive cases was 3 standard deviations from state-specific baselines in OK, KS, MO, and NC;
- There was 0 positive case for TGEV RNA in May, 2021 over a total of 3,143 cases tested;
- The advisory group pointed that sow farms that broke with PDCoV this Winter are now testing negative, and positivity is likely to reduce during warmer months. Caution should be taken since the risk of spread across farms remains.

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

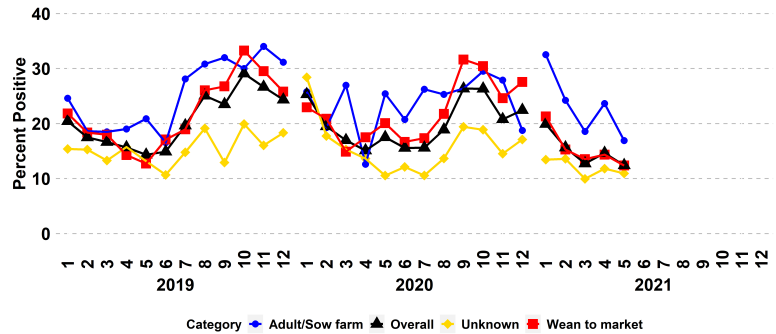
Mycoplasma hyopneumoniae submissions tested by RT-PCR over time

Source: ISU-VDL, UMN-VDL, SDSU-ADRDL, and KSU-VDL.



Mycoplasma hyopneumoniae percentage of positive submissions by age category

Source: ISU-VDL, UMN-VDL, SDSU-ADRDL, and KSU-VDL.



Mycoplasma hyopneumoniae percentage of positive submissions

Source: ISU-VDL, UMN-VDL, SDSU-ADRDL, and KSU-VDL.

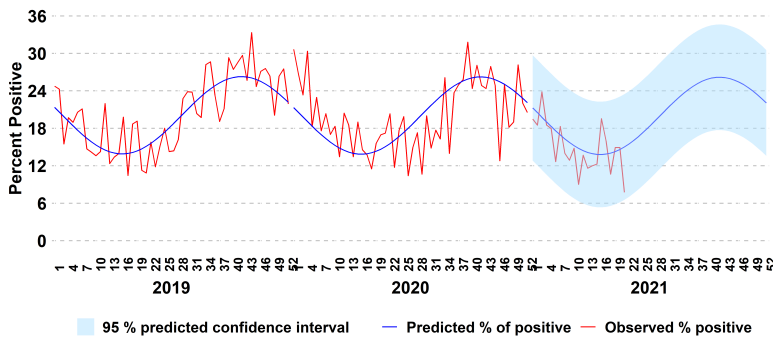


Figure 3. Left top: results of MHP PCR cases over time. Right top: percentage of MHP PCR-positive results, by category over time. Bottom: expected percentage of positive results for MHP by PCR and 95% confidence interval for 2020 predicted value, based on weekly data observed in the previous 3 years.

SDRS Advisory Group highlights:

- Overall, 12.41% of 580 cases tested *M. hyopneumoniae*-positive cases in May, a moderate decrease from 14.65% of 751 in April;
- Positivity in adult/sow category in May was 16.9% (12 of 71), a substantial decrease from 23.66% (22 of 93) in April;
- Positivity in wean-to-market category in May was 12.37% (37 of 299), similar to 14.36% (58 of 404) in April;
- Overall MHP-percentage of positive was within state-specific baselines in all 11 monitored states.

Advisory group advise for preventing a new wave of pathogen activity for upcoming fall and winter seasons

- Keep practicing and having continued discussions on biosecurity and biocontainment. Do not let your guards down;
- Keep working with finishing sites to implement basic biosecurity practices;
- Implementing good farm cleaning and disinfecting procedures during upcoming warm months to reduce environmental contamination;
- Continued efforts to wash all market trailers between each load and before returning to sites;
- Whenever possible, focus on marketing site depopulation followed by good cleaning and disinfection. Especially applied to situations where washing truck is not feasible;
- Closely work with and watch finishing loading crews to prevent the spread of pathogens across sites;
- For filtered farms, inspect and change filters as needed before high-risk periods;
- Tighter biosecurity around the pumping season. Organize traffic around farms and educate the pumping personnel;
- During the pumping and harvesting season, work hard to avoid cross-traffic of premise site workers and barn workers in areas like mortality disposal, parking areas, and supply entry areas;
- Consider whenever possible immunological interventions for pigs in areas at moderate risk and or sites where the history provides reason to believe that those animals are at risk.

Topic 4 – Disease diagnosis at the ISU-VDL.

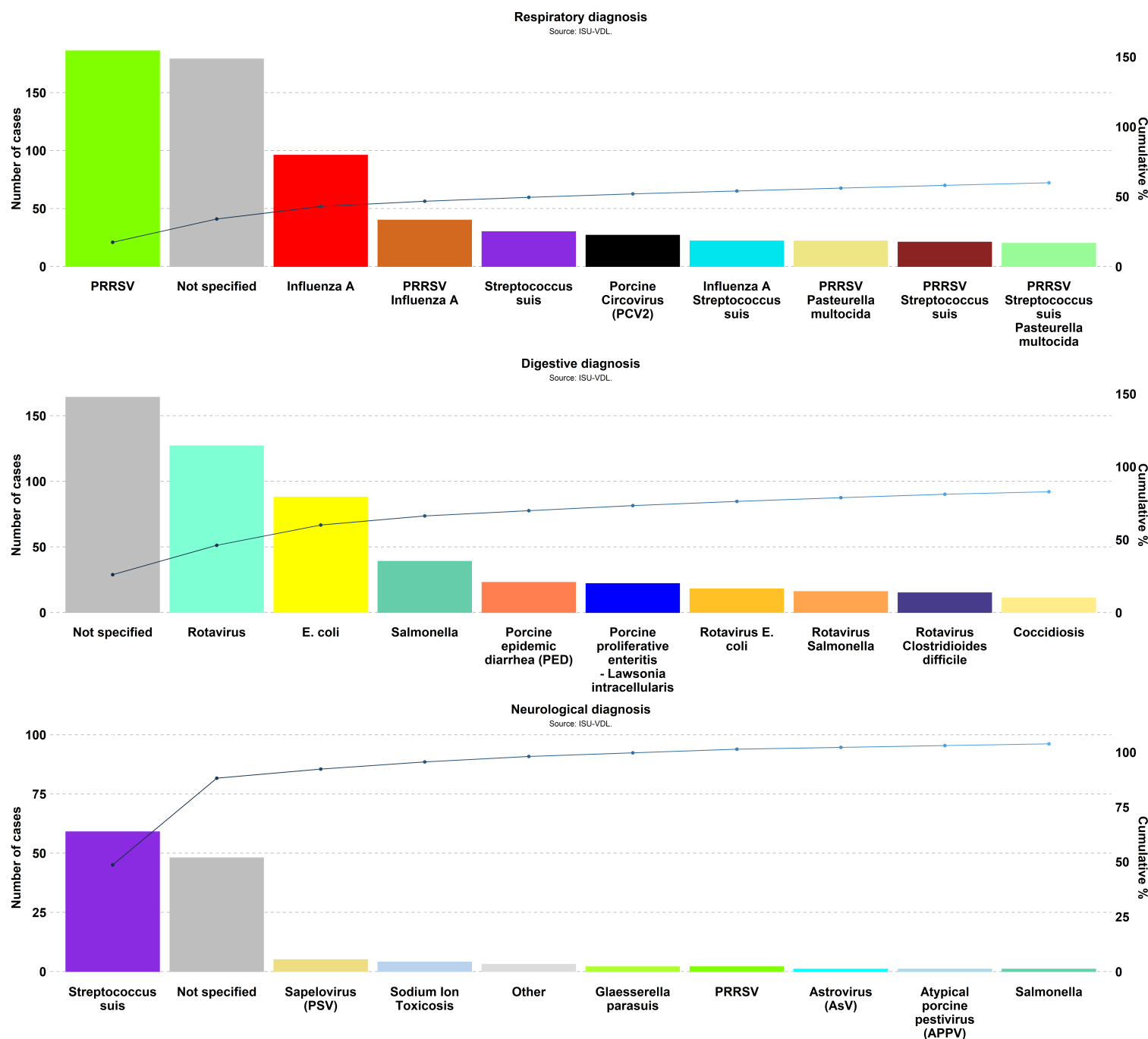


Figure 4. Most frequent disease diagnosis by physiologic system at ISU-VDL . Presented system is described in the title of the chart. Colors represent one agent and/or the combination of 2 or more agents. Only the physiologic systems with historic number of cases per season above 100 are presented in the report.

Note: Disease diagnosis takes one to two weeks to be performed. The graphs and analysis contain data from April 1, 2021 to May 16, 2021.

SDRS Advisory Group highlights:

- PRRSV (186 of 1072) continues to lead the number of respiratory diagnoses. After not specified (164 of 631), Rotavirus (127 of 515) continues to lead the number of digestive diagnoses. *S. suis* (59 of 131) continues to lead the number of neurological diagnosis;
- During April 12 to 25, there was a significant increase (signal) in the diagnosis of agents classified as respiratory;
- During April 12 to 18, there was a significant increase (signal) in the diagnosis of agents classified as systemic, nervous, and digestive;
- During March 29 to April 18, there was a significant increase (signal) in the diagnosis of Influenza A;
- During April 19 to May 1, there was a significant increase (signal) in the diagnosis PRRSV;
- During April 12 to 25, there was a significant increase (signal) in the diagnosis of *P. multocida* and *G. parasuis*;
- The advisory group pointed that the activity of *P. multocida* and *G. parasuis* are occurring as a secondary infection of primary agents like PRRSV and Influenza A.

Update on PRRSV RFLP 1-4-4 L1C variant strain detection from ISU and UMN-VDL

In 2020 a new PRRSV strain emerged and become known as PRRSV 1-4-4 L1C variant. The emergence of a new PRRSV strain is not surprising since the RNA virus has low fidelity rates in its replication process. This strain, in particular, was firstly detected in MN in January of 2020. During the fall of 2020, this strain was associated with severe clinical problems. Between February and March of 2021, there was no evidence of further spread of the virus in sow farms. However, the virus activity remained increasing in grow-finish. In May of 2021, there were new complaints about the activity of this strain, with some of the cases having low Ct values (in the teens). Here SDRS provides an update on the detection of the PRRSV RFLP 1-4-4 L1C variant strain.

The most recent spike of PRRSV RFLP 1-4-4 was at the end of March and in April (Fig 1, upper left). From January 2020 up to May 30 2021, 1,194 PRRSV RFLP 1-4-4 strains were recovered, whereas 138 pertained to L1C and 386 to L1C variant ($\geq 99\%$ or greater similarity in ORF-5). Additionally, there were RFLP 1-4-4 sequences classified as L1D, L1A, L7, and L8 (Fig 1, upper right). An initial wave of detection occurred during October/November 2020, mainly in MN and IA. During April and May of 2021, the second wave of detection is underway, with the majority of the detections occurring in MN and IA. Still, there is additional evidence of spread for this strain, detecting at least one sequence in MO, IL, and WI. Although these PRRSV strains are primarily classified as RFLP 1-4-4, 2 detections were classified as RFLP 1-4-3, 2 as RFLP 1-7-4, and 1 as RFLP 1-2-4.

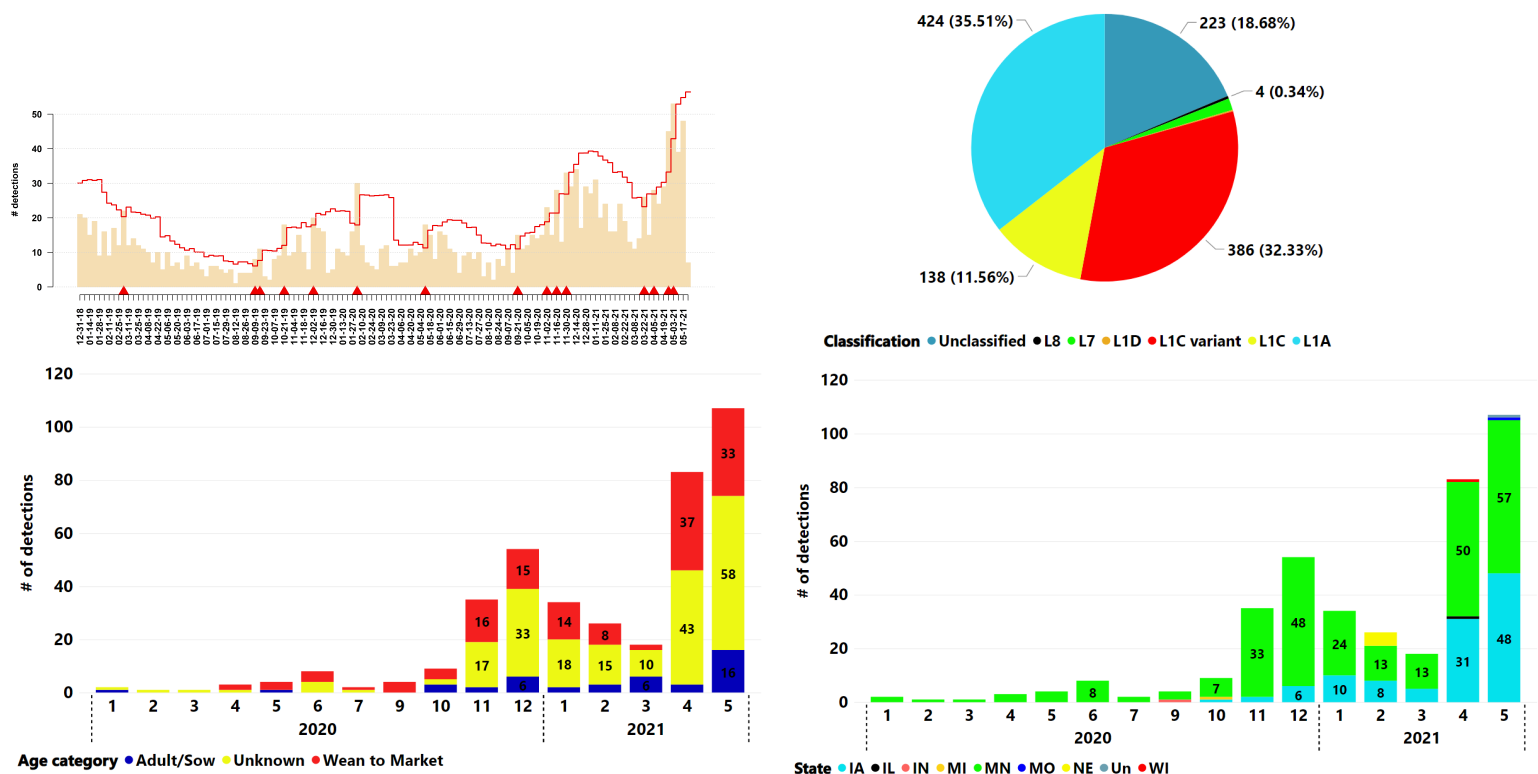


Figure 1: Upper Left: Weekly monitoring of counts of PRRSV strains classified as RFLP 1-4-4. x-axis = week of the year. Letters y-axis = number of detections. Bars = weekly number of diagnoses. Line = upper threshold for the expected weekly number of diagnoses considering 3 SDs from the mean baseline formed from data from the previous 7 wk. Upper right Distribution of PRRSV strains classified as RFLP 1-4-4 according to lineages Lower Left: Number of recovered PRRSV RFLP 1-4-4 L1C variant strain by age category and month Lower Right: Number of recovered PRRSV RFLP 1-4-4 L1C variant strains by state over time.

Highlights:

- Not all sequences classified as RFLP 1-4-4 L1C are the same as the L1C variant strain;
- A second wave of L1C variant strains has been occurring since April.

References

Complete genome and near complete genome of the PRRSV RFLP 1-4-4 L1C variant strain have been made available in Genbank. GenBank accession no. [MW887655](#) and no. [MW646386](#).

Note: Contact the SDRS project if you would like to share your work on the bonus page.