Swine Disease Reporting System - Advisory Group Report
Report # 81 (November 5, 2024)

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.

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, 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 ADDL, and Purdue ADDL.

Collaborators:

Swine Disease Reporting System office: Principal investigators: Daniel Linhares & Giovani Trevisan; Project coordinator: Guilherme Cezar

Iowa State University: Edison Magalhães, Gustavo Silva, Marcelo Almeida, Bret Crim, Kinath Rupasinghe, Srijita Chandra, Eric Burrough, Phillip Gauger, Joseph Thomas, Darin Madson, Michael Zeller, Rodger Main.

University of Minnesota: Mary Thurn, Paulo Lages, Cesar Corzo, Stephanie Rossow, Matt Sturos, Hemant Naikare.

Kansas State University and *Kansas Dept. of Agr.*: Rob McGaughey, Franco Matias-Ferreyra, Jamie Retallick, Jordan Gebhardt, Sara McReynolds.

South Dakota State University and *South Dakota AIB*: Jon Greseth, Darren Kersey, Travis Clement, Angela Pillatzki, Jane Christopher-Hennings, Beth Thompson.

Ohio Animal Disease and Diag. Lab. and *The Ohio State University*: Melanie Prarat, Dennis Summers, Andréia Arruda.

Purdue University and *Indiana State BOAH*: Craig Bowen, Kenitra Hendrix, Joseph Boyle, James Lyons, Kelli Werling.

Disease Diagnosis System: Consisting of reporting disease diagnosis (not just pathogen detection by PCR), based on diagnostic codes assigned by veterinary diagnosticians from ISU-VDL.

PRRSView and FLUture: Aggregates PRRSV and influenza A virus diagnostic data from the ISU-VDL.

PRRS virus RFLP/Lineage report and BLAST tool: Benchmark PRRSV ORF5 sequences and compare your PRRSV sequence with what have been detected in the U.S.

Audio and video reports: Key findings from SDRS projects are summarized monthly in a conversation between investigators and is available in the Spotify, Apple Podcast, Google podcast, YouTube, LinkedIn, and the SDRS webpage. In addition to this report, interactive dashboards and educational material are publicly available.

Advisory Group: Providing their comments and perspectives monthly: Mark Schwartz, Megan Niederwerder, Paul Yeske, Deborah Murray, Brigitte Mason, Peter Schneider, Sam Copeland, Luc Dufresne, Daniel Boykin, Corrine Fruge, William Hollis, Rebecca Robbins, Thomas Petznick, Kurt Kuecker, and Lauren Glowzenski.

Note: This report contains data up to October 31, 2024.

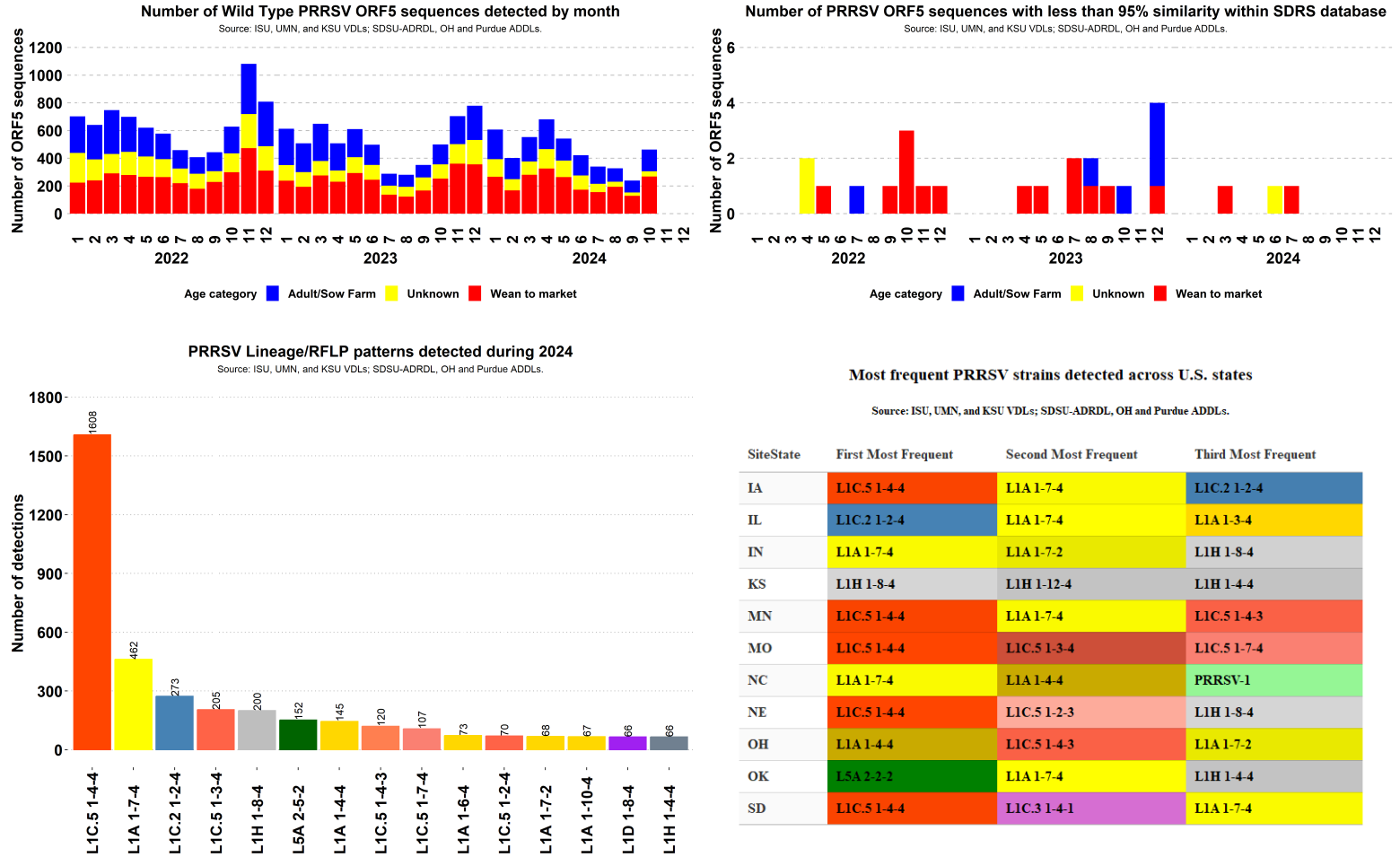# Topic 1 – Detection of PRRSV RNA over time by RT-qPCR.
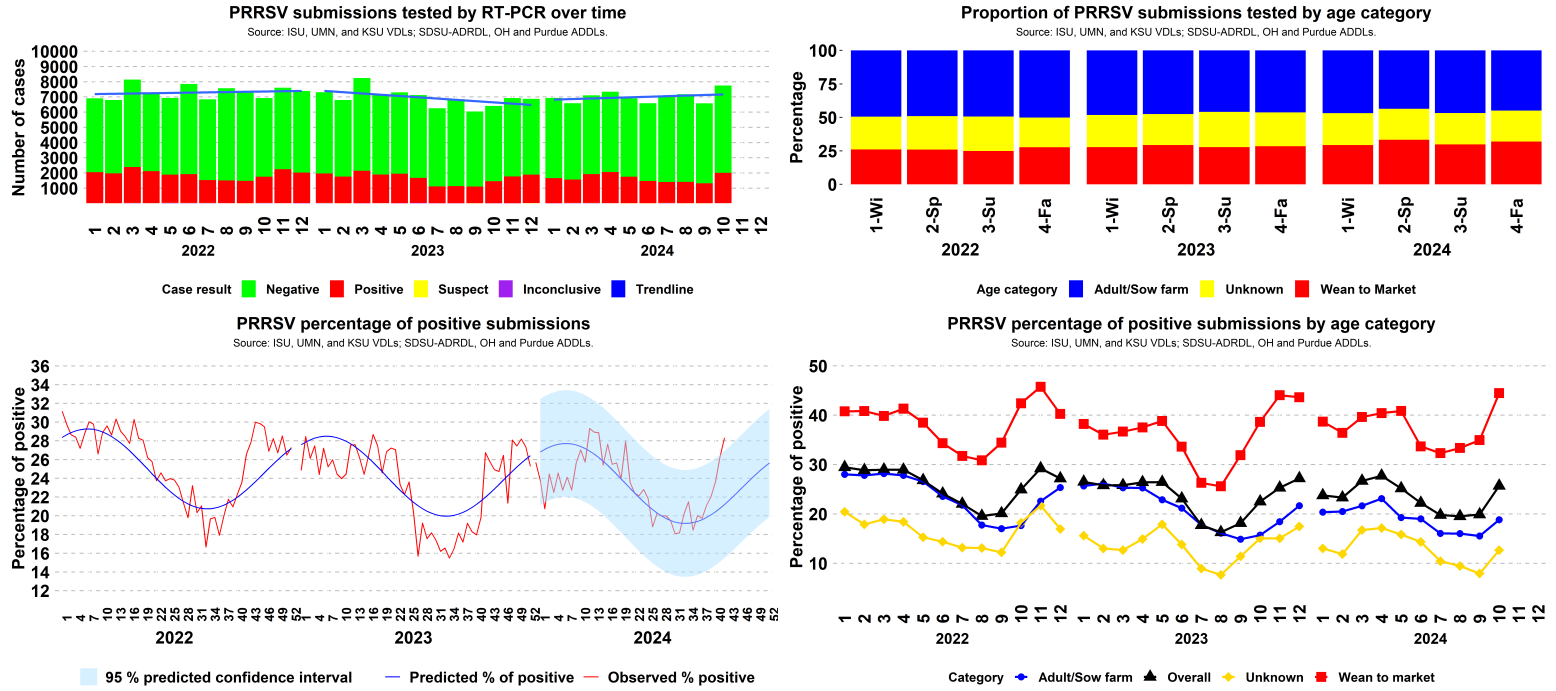
Figure 1. Top: *Left*: Results of PRRSV RT-PCR cases over time; *Right*: Proportion of accession ID cases tested for PRRSV by age group per year and season. **Bottom**: *Left* Expected percentage of positive results for PRRSV RNA by RT-qPCR, with 95% confidence interval band for predicted results based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

SDRS Advisory Group highlights:

- Overall, 25.69% of 7,749 cases tested PRRSV-positive in October, a substantial increase from 19.89% of 6,577 in September;
  - Positivity in the adult/sow category in October was 18.82% (647 of 3,438), a moderate increase from 15.54% (466 of 2,999) in September;
  - Positivity in the wean-to-market category in October was 44.46% (1,116 of 2,510), a substantial increase from 34.95% (722 of 2,066) in September;
- Overall PRRSV-percentage of positive cases was 3 standard deviations above state-specific baselines in IA, IN, OK, and SD;
- The advisory group highlighted that the recent increased detection of PRRSV, aligned with their field perspective, which emphasize the importance of enhancing the biosecurity in this period where the activity of the virus started to spike. The advisory pointed that they were dealing mostly with strains L1C in the field, with different RFLP patterns. Also, they highlighted the increase of co-infections, such as Influenza and MHP occurring with PRRSV.

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Topic 2 – PRRSV ORF5 sequences detection over time

Number of Wild Type PRRSV ORF5 sequences detected by month
Source: ISU, UMN, and KSU VDLs; SDSU-ADRDL, OH and Purdue ADDLs.

Number of PRRSV ORF5 sequences with less than 95% similarity within SDRS database
Source: ISU, UMN, and KSU VDLs; SDSU-ADRDL, OH and Purdue ADDLs.

PRRSV Lineage/RFLP patterns detected during 2024
Source: ISU, UMN, and KSU VDLs; SDSU-ADRDL, OH and Purdue ADDLs.

Most frequent PRRSV strains detected across U.S. states
Source: ISU, UMN, and KSU VDLs; SDSU-ADRDL, OH and Purdue ADDLs.

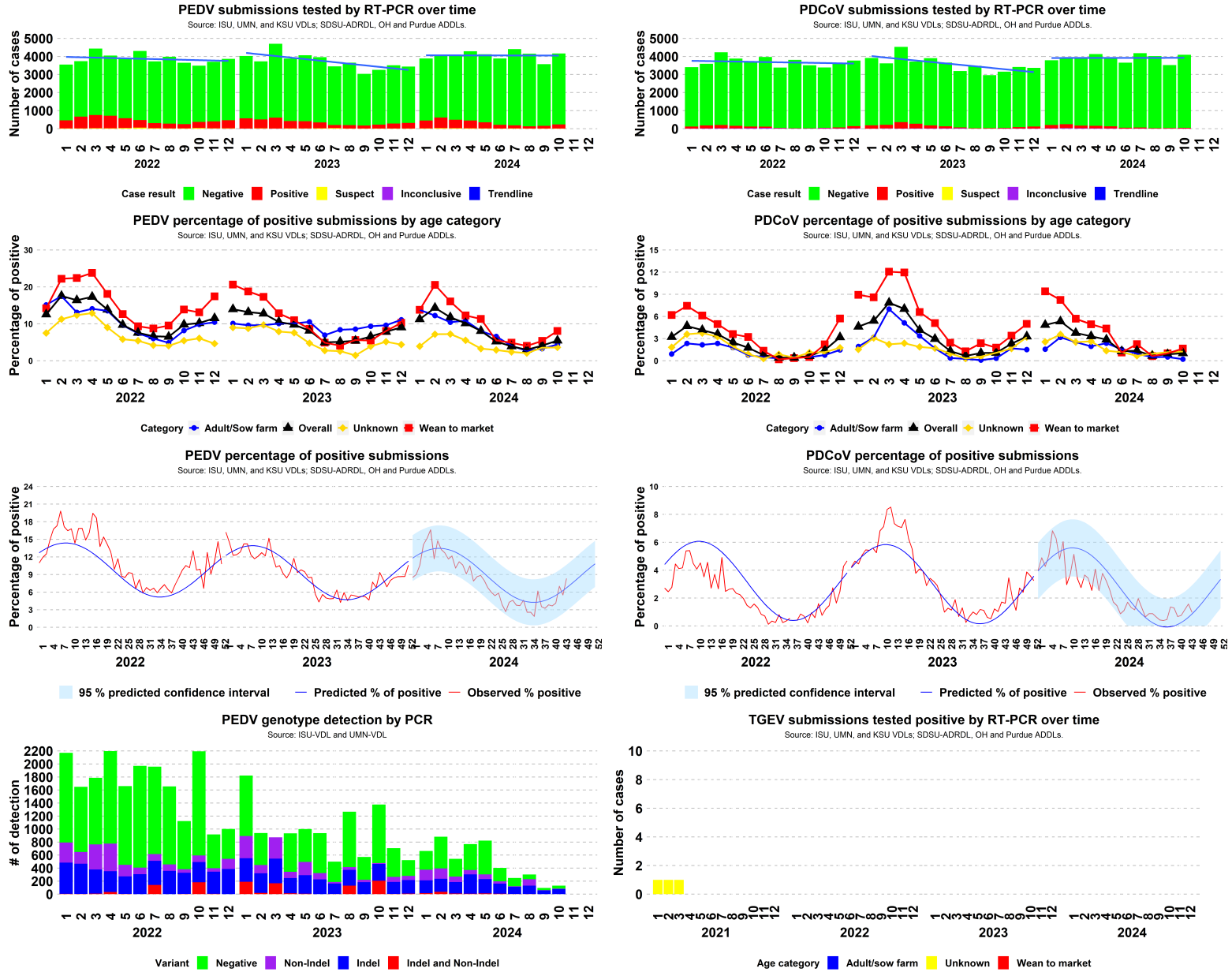| SiteState	First Most Frequent	Second Most Frequent	Third Most Frequent
IA	L1C.5 1-4-4	L1A 1-7-4	L1C.2 1-2-4
IL	L1C.2 1-2-4	L1A 1-7-4	L1A 1-3-4
IN	L1A 1-7-4	L1A 1-7-2	L1H 1-8-4
KS	L1H 1-8-4	L1H 1-12-4	L1H 1-4-4
MN	L1C.5 1-4-4	L1A 1-7-4	L1C.5 1-4-3
MO	L1C.5 1-4-4	L1C.5 1-3-4	L1C.5 1-7-4
NC	L1A 1-7-4	L1A 1-4-4	PRRSV-1
NE	L1C.5 1-4-4	L1C.5 1-2-3	L1H 1-8-4
OH	L1A 1-4-4	L1C.5 1-4-3	L1A 1-7-2
OK	L5A 2-2-2	L1A 1-7-4	L1H 1-4-4
SD	L1C.5 1-4-4	L1C.3 1-4-1	L1A 1-7-4

Figure 1. Top: **Left**: Number of PRRSV ORF5 sequences detected by age category; **Right**: Number of PRRSV ORF5 sequences with less than 95% similarity after BLAST analysis with the sequences in the SDRS database (Sequences with more than 6 ambiguities, sequences with less than 597 nucleotides or higher than 606 nucleotides are not included in this analysis); **Bottom** *Left*: 15 PRRSV ORF5 sequences most frequent detected by Lineage and RFLP; *Right*: Most frequent detected PRRSV ORF5 sequences by lineage and RFLP at U.S. state level.

SDRS Advisory Group highlights:

• During October 2024, The states with higher number of PRRSV L1C.5 (variant) detections were detected IA, MO, NE, MN, IL, OH, IN, SD, WI (respective number of sequences: 209, 34, 23, 10, 5, 2, 1, 1, 1).

• In October L1C.5 1-4-4 (199) was the PRRSV sequence most detected in the U.S., followed by L1A 1-7-4 (47), and L1C.5 1-3-4 (46);

• Click on the links here to access the PRRSV genotype dashboard and the SDRS Blast tool to compare your PRRSV ORF5 sequence with the SDRS database.

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Topic 2 – Enteric coronavirus RNA detection by RT-qPCR

Figure 1. Top: *Left PEDV*; *Right PDCoV* cases tested by RT-PCR over time; **Second from top**: *Left PEDV*; *Right PDCoV* percentage of positive 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-PCR and 95% confidence interval for 2024 predicted value. **Bottom** *Left*: Number of PEDV genotype detection over time; *Right*: Number of TGEV positive cases by age category.

SDRS Advisory Group highlights:

- Overall, 5.48% of 4,163 cases tested PEDV-positive in October, similar to 4.11% of 3,574 in September;
  - Positivity in the adult/sow category in October was 4.44% (66 of 1,487), similar to 3.26% (40 of 1,228) in September;
  - Positivity in the wean-to-market category in October was 8.07% (118 of 1,462), a moderate increase from 5.38% (70 of 1,301) in September;
  - Overall PEDV-percentage of positive cases was within state-specific baselines in all 11 monitored states;
  - Overall, 0% of 130 samples had mixed PEDV genotype detection in October, similar to 0% of 96 in September;
- Overall, 1.03% of 4,092 cases tested PDCoV-positive in October, similar to 0.88% of 3,521 in September;
  - Positivity in the adult/sow category in October was 0.21% (3 of 1,438), similar to 0.51% (6 of 1,188) in September;
  - Positivity in the wean-to-market category in October was 1.65% (24 of 1,451), similar to 1% (13 of 1,297) 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, 2024 over a total of 3,955 cases tested. It has been 43 months (with a total of 152,313 cases tested) since the last TGEV PCR-positive result;
- The advisory group highlighted that even though in some places there are low activity of PEDV and PDCoV, efforts to enhance biosecurity, including testing sites with PEDV-positive pigs and improving truck and trailer sanitation, should be implemented since crops were harvested and manure will be pumped, which can contribute for these viruses spike up.

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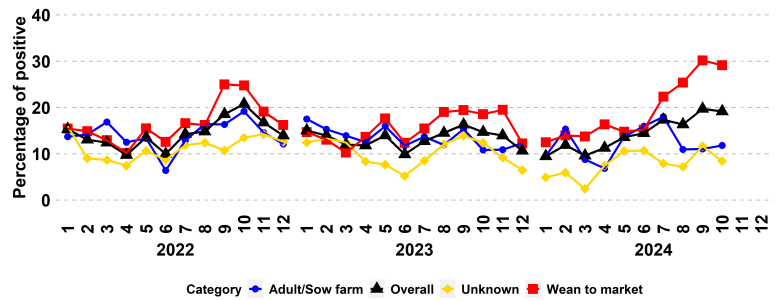**SDRS report 81**

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

Mycoplama hyopneumoniae submissions tested by PCR over time
Source: ISU, UMN, and KSU VDLs; SDSU-ADRDL, OH and Purdue ADDLs.

Case result — Negative — Positive — Suspect — Inconclusive — Trendline
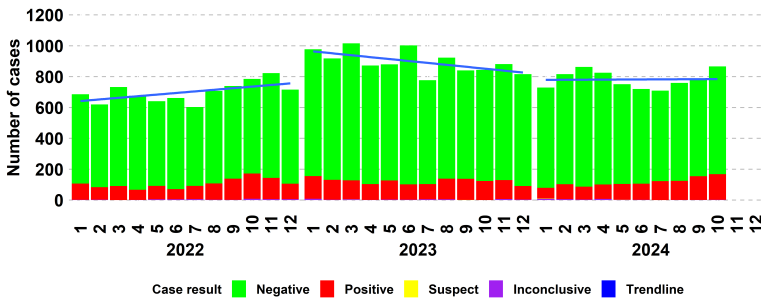
Mycoplasma hyopneumoniae percentage of positive submissions by age category
Source: ISU, UMN, and KSU VDLs; SDSU-ADRDL, OH and Purdue ADDLs.

Category — Adult/Sow farm — Overall — Unknown — Wean to market

Mycoplasma hyopneumoniae percentage of positive submissions
Source: ISU, UMN, and KSU VDLs; SDSU-ADRDL, OH and Purdue ADDLs.

95 % predicted confidence interval — Predicted % of positive — Observed % positive
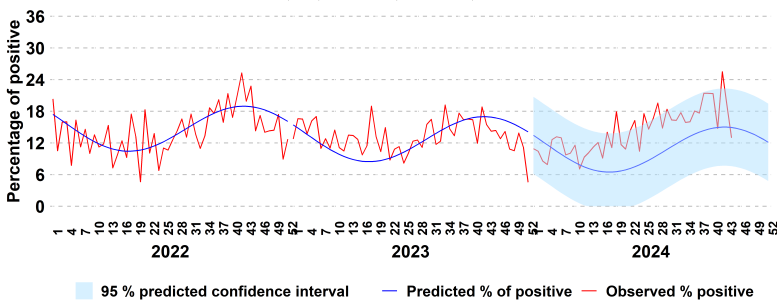
Figure 3. Top: *Left* MHP; MHP Case results tested by PCR over time. *Right* MHP PCR-positive results, by category over time. **Bottom:** expected percentage of positive results for MHP by PCR and 95% confidence interval for 2024 predicted value, based on weekly data observed in the previous 5 years.

SDRS Advisory Group highlights:

- Overall, 19.17% of 866 cases tested *M. hyopneumoniae*-positive cases in October, similar to 19.72% of 781 in September;
  - Positivity in the adult/sow category in October was 11.81% (32 of 271), similar to 11.07% (28 of 253) in September;
  - Positivity in the wean-to-market category in October was 29.14% (118 of 405), similar to 30.17% (105 of 348) in September;
- Overall MHP-percentage of positive cases was 3 standard deviations above state-specific baselines SD, IL, KS and OK;
- The advisory group highlighted that the increased in MHP positivity might be due efforts to improve MHP gilt exposure processes and confirmatory diagnostics at their companies. Also, some systems tested mostly downstream, and increased surveillance in sow farms, with no lateral infections found. The advisory emphasized the importance of continuing elimination programs despite increased activity at finishing sites. In addition, some advisory members highlighted that the seasonal spikes in MHP-positive cases might be linked to co-infections with Influenza.

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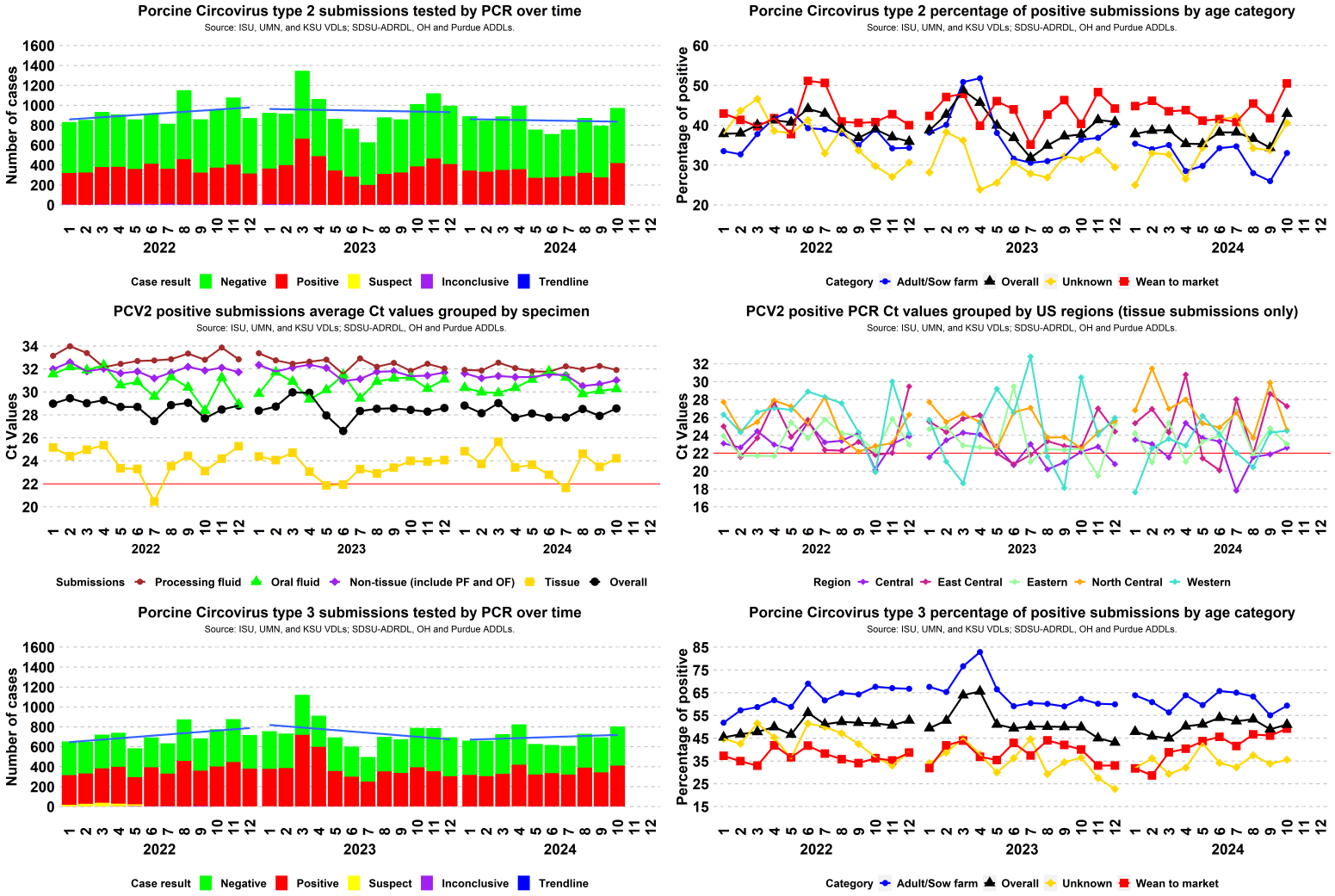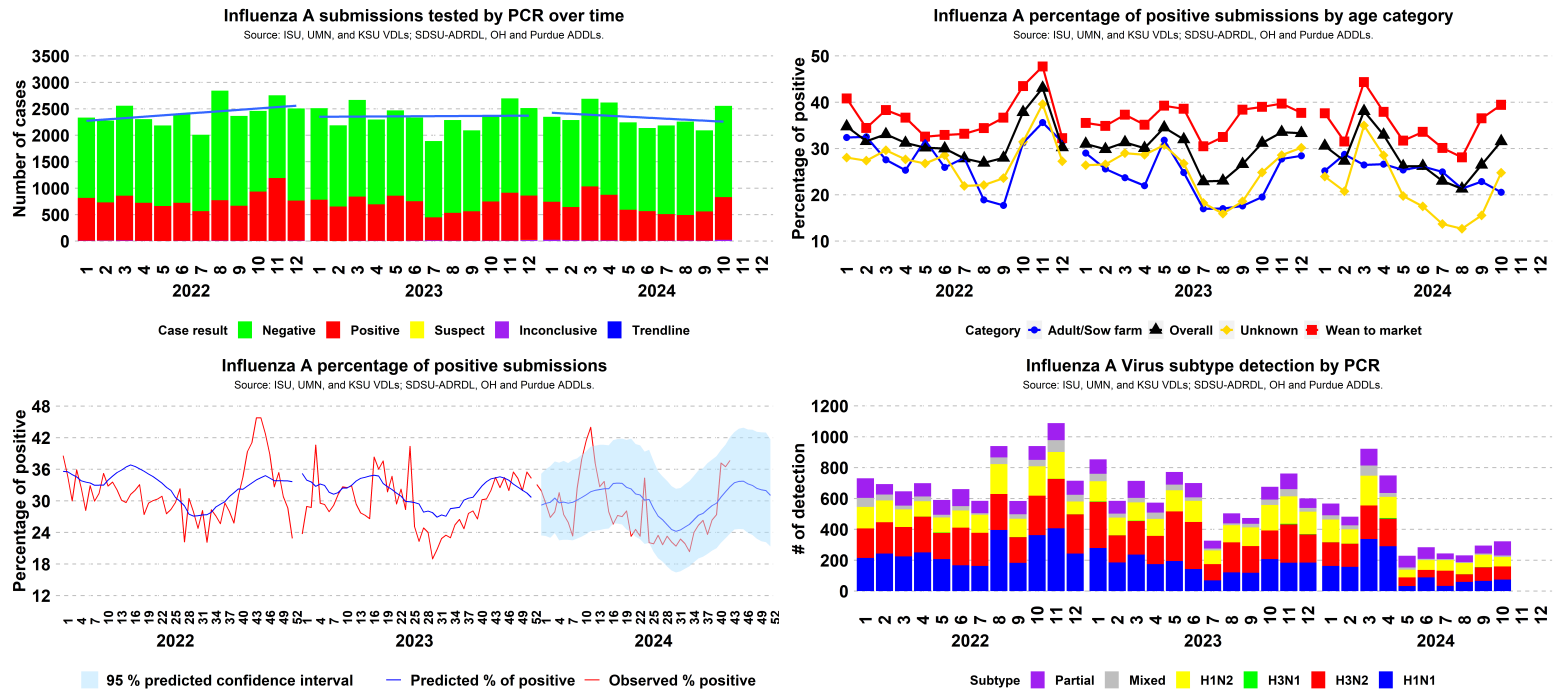

Figure 1. Top: *Left*: Results of PCV2 PCR cases over time; *Right*: PCV2 PCR-positive results, by category over time. **Middle**: *Left*: Average Ct values of PCV2 submissions by specimen; *Right*: Average Ct values of PCV2 tissue submissions by U.S. region; Central (IA), East Central (IL, IN, MO and 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, 42.92% of 974 cases tested PCV2-positive in October, a substantial increase from 34.34% of 795 in September;
  - Positivity in the adult/sow category in October was 33.04% (113 of 342), a substantial increase from 25.98% (86 of 331) in September;
  - Positivity in the wean-to-market category in October was 50.51% (247 of 489), a substantial increase from 41.73% (159 of 381) in September;
  - In the month of October, the regions with the lowest PCV2 average Ct values in tissue submissions was Central (58 submissions; average Ct 22.6), Eastern (20 submissions; average Ct 23), Western (16 submissions; average Ct 24.5), North Central (19 submissions; average Ct 24.6), and East Central (20 submissions; average Ct 27.3);
- Overall, 51% of 804 cases tested PCV3-positive in October, a moderate increase from 48.99% of 694 in September;
  - Positivity in the adult/sow category in October was 59.33% (178 of 300), a moderate increase from 55.13% (172 of 312) in September;
  - Positivity in the wean-to-market category in October was 49.22% (190 of 386), a moderate increase from 46.18% (145 of 314) in September.

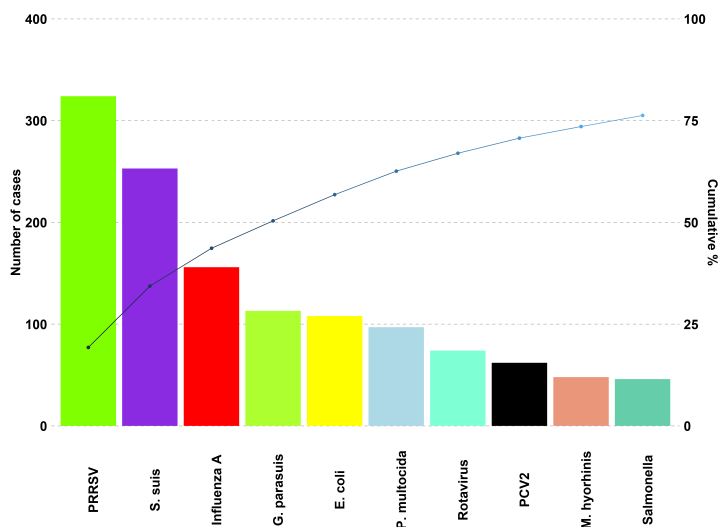# Topic 5 – Detection of Influenza A Virus (IAV) RNA by RT-PCR.

Figure 3. Top: *Left* Results of IAV PCR cases over time. *Right* Percentage of IAV PCR-positive results, by category over time. **Bottom:** *Left* expected percentage of positive results for IAV by PCR and 95% confidence interval for 2024 predicted value, based on weekly data observed in the previous 5 years. *Right* 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, 31.56% of 2,557 cases tested IAV-positive cases in October, a substantial increase from 26.48% of 2,092 in September;
  - Positivity in the adult/sow category in October was 20.56% (111 of 540), a moderate decrease from 22.88% (97 of 424) in September;
  - Positivity in the wean-to-market category in October was 39.43% (528 of 1,339), a moderate increase from 36.52% (344 of 942) in September.
- Overall IAV-percentage of positive cases was 3 standard deviations above state-specific baselines in MO;
- Overall, 3.1% of 323 samples had mixed subtype detection in October, similar to 2.71% of 295 in September.

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SWINE DISEASE REPORTING SYSTEM
Disease Diagnosis Reports

IOWA STATE UNIVERSITY
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SHIC
Swine Health Information Center

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IOWA PORK PRODUCERS ASSOCIATION
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Topic 6 – Confirmed tissue cases etiologic/disease diagnosis at the ISU-VDL.
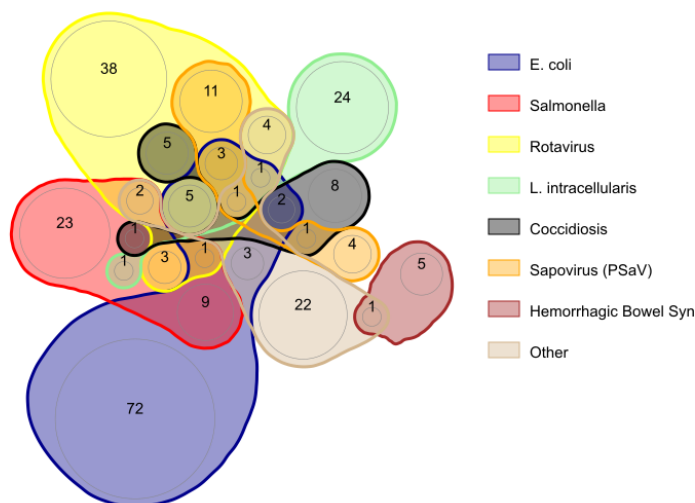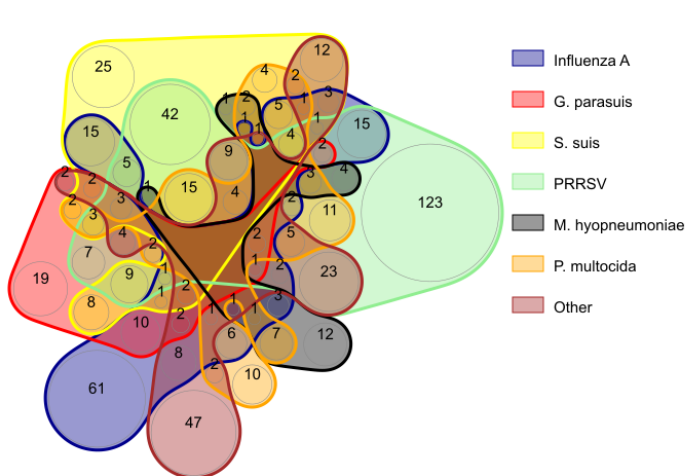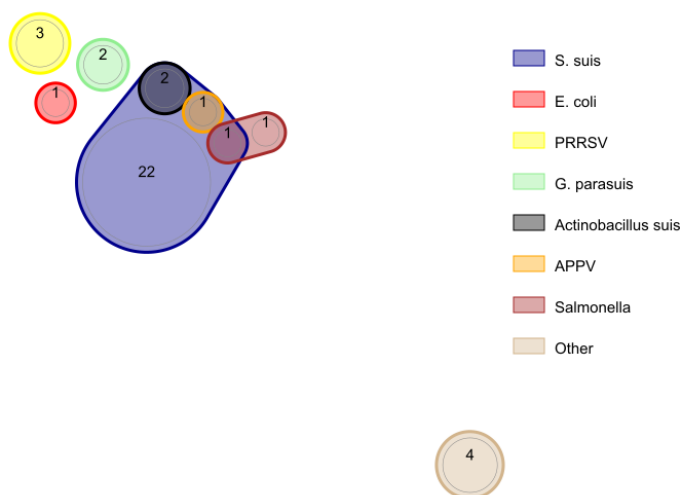
Figure 4. ISU-VDL most frequent overall confirmed tissue disease diagnosis. The presented system is described in the title of the chart. Colors represent one agent; line intersections present diagnosis of 2 or more agents within a submission. Only the most frequent etiology/disease are presented. Less 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. 25, 2024.

SDRS Advisory Group highlights:
• PRRSV (324) led cases with confirmed etiology, followed by *S. suis* (253), and *Influenza A* (156). PRRSV (303 of 1009) led the number of confirmed respiratory diagnoses, *E. coli* (97 of 314) lead the number of confirmed digestive diagnoses, and *S. suis* (26 of 41) led the number of confirmed neurological diagnoses.
• There were consecutive alarms for increased number of respiratory cases on the weeks of September 30th and October 7th, mainly driven by an increase in confirmed Influenza A virus, PRRSV, and *Pasteurella multocida* diagnoses.

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Trends supporting effective *Mycoplasma hyopneumoniae* control in breeding herds

Guilherme Cezar[1], Kinath Rupasinghe[1], Daniel Linhares[1], Giovani Trevisan[1]

1 - Iowa State University, Ames, IA, USA.

Mycoplasma hyopneumoniae (MHP) is a prevalent and economically impactful respiratory pathogen causing enzootic pneumonia that results in a persistent, non-productive cough. The pathogenicity of MHP arises from its ability to adhere to and damage the ciliary epithelium in the respiratory tract's trachea, bronchi, and bronchioles. MHP causes decreased feed efficiency, reduced average daily gain, and increased medication costs. MHP also plays a significant role in the porcine respiratory disease complex, interacting with other respiratory pathogens.

Therefore, the U.S. has discussed the elimination of this pathogen for several years, with several protocols being implemented to eliminate MHP from breeding herds. The SDRS has MHP data since 2002. As a result, the SDRS team identified detection trends over time, demonstrating trends from the U.S. industry toward eliminating this pathogen.

First, the percentage of positive submissions from breeding herds decreased substantially from 2021 (21.75%) to 2022 (13.5%) and has kept a lower level since then (Figure 1). However, the wean-to-market submissions had a peak in positivity since August 2024, which may be a concern regarding biosecurity for sow farms.

Figure 1. Percentage of PCR-positive *Mycoplasma hyopneumoniae* submissions by age category over time.
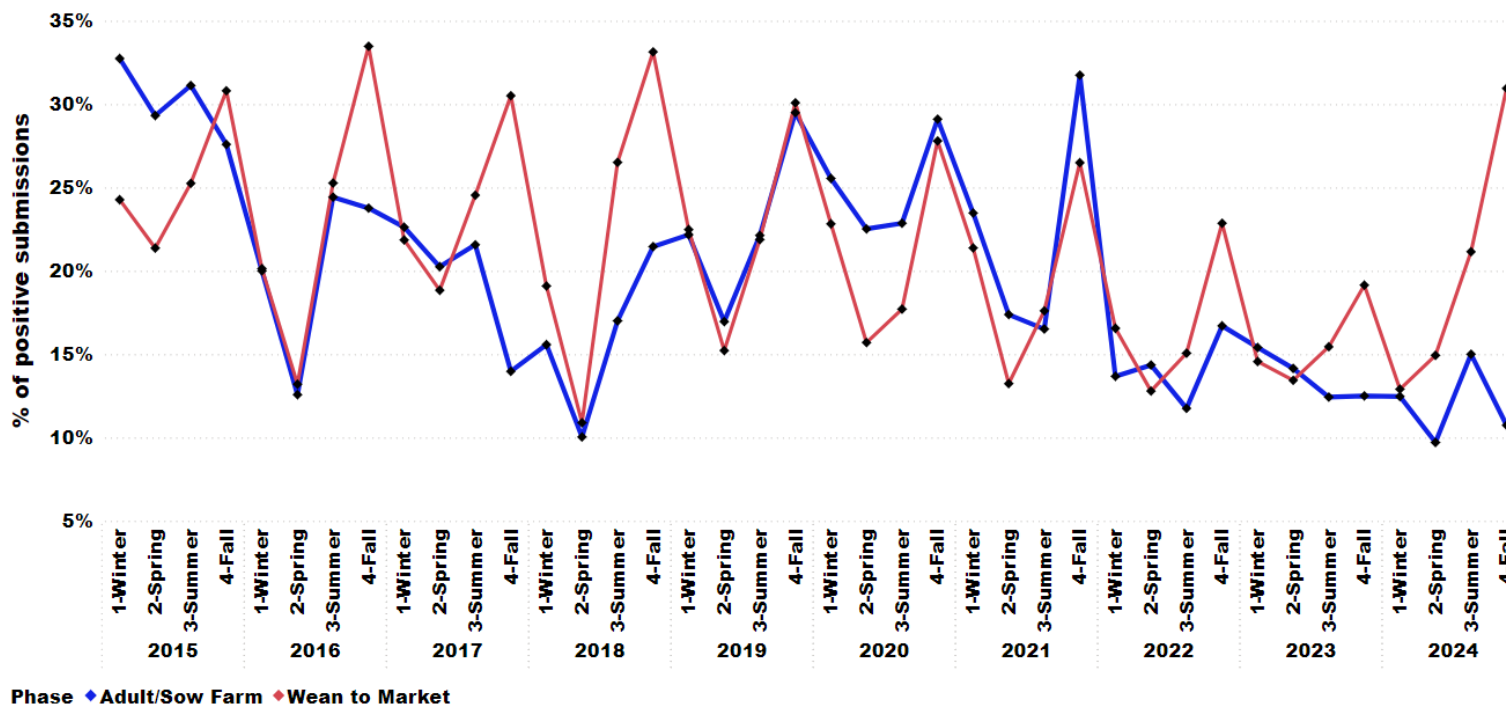
Another piece of information supporting the industry's MHP elimination trends is the percentage of samples submitted for MHP PCR testing. Since 2023, there has been a gradual increase in the usage of deep tracheal swabs (pink color in Figure 2), a sample type considered one of the most sensitive to screen pigs in breeding herds or gilt development units.

Figure 2: Percentage of specimens tested for *Mycoplasma hyopneumoniae* DNA by PCR.
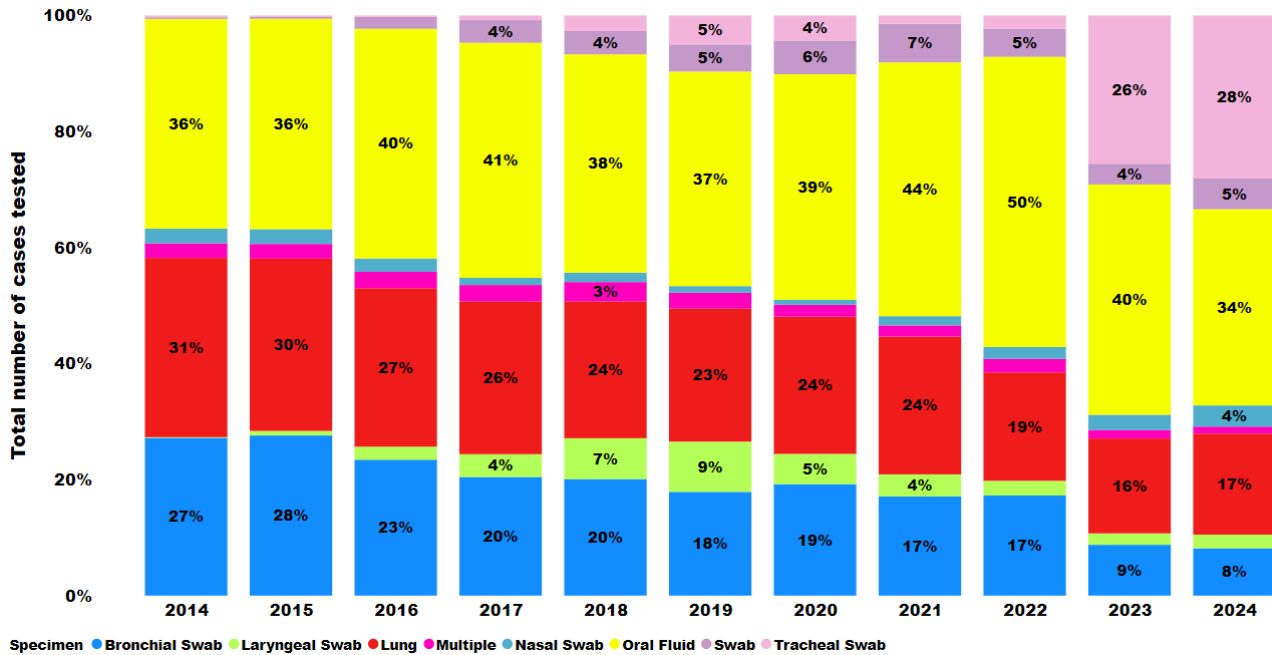
In addition, using Iowa State University data, the number of cases with a confirmed tissue diagnosis for MHP (cases where diagnosticians gather all the information as clinical history, tests performed, and microscopic and macroscopic lesions) decreased over time, reaching a record low number in 2024 (Figure 3).

Figure 3: Quarterly number of confirmed tissue diagnoses of *Mycoplasma hyopneumoniae* of cases evaluated by diagnosticians over time.
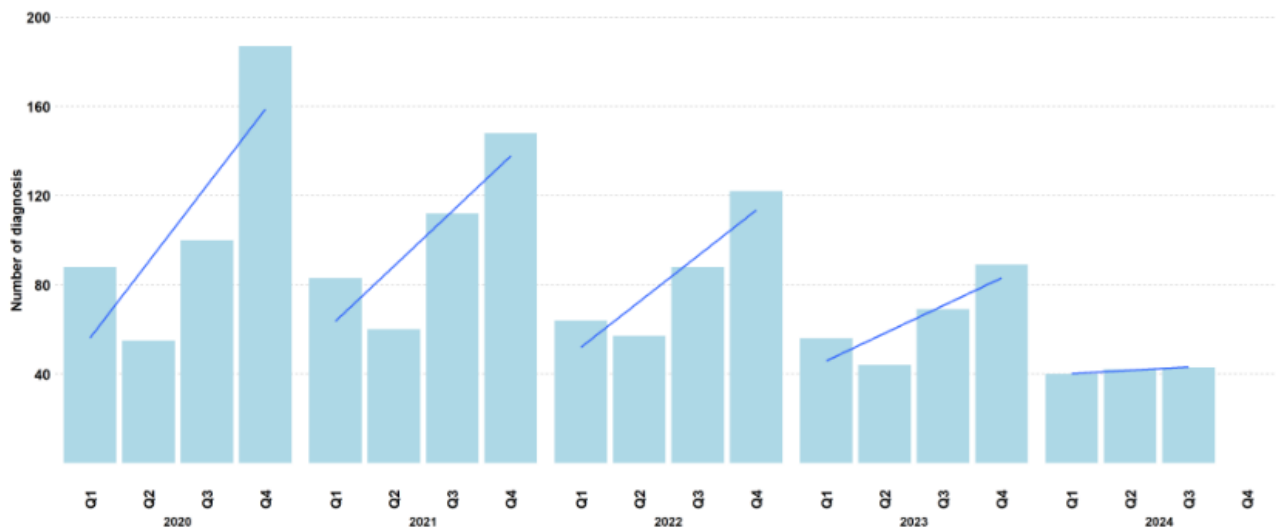
As a result, the SDRS data documents progress in the industry's efforts to eliminate MHP from breeding herds. Still, there is significant MHP activity to declare victory – efforts should remain to further reduce MHP impact in the U.S. swine herds. Particularly, there is a concern about the finishing sites still having increased positivity levels, which might indicate a possible biosecurity bridge issue. SDRS will keep monitoring MHP and other pathogens to inform the swine industry about pathogen activity in the U.S.

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