Swine Disease Reporting System

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report 13 (March 5th, 2019)

What is the SDRS?

SHIC-funded, veterinary diagnostic laboratories (VDLs) collaborative project, with goal to aggregate swine diagnostic data from participating reporting VDLs, and deliver monthly reports, as well as to summarize results in an intuitive format (web dashboards), describing dynamics of disease detection by pathogen or disease syndrome over time, specimen, age group, and geographical space.

For this report, data is from the Iowa State University VDL and South Dakota State University ADRDL. University of Minnesota VDL and Kansas State University VDL. Specifically, for PRRSV RFLP data, and syndromic information the results are from Iowa State University VDL.

For all "2019 predictive graphs", the expected value was calculated using a statistical model that considers the results from 3 previous years. The intent of the model is not to compare the recent data (2019) to individual weeks of previous years. The intent is to estimate expected levels of percent positive cases based on patterns observed in the past data, and define if observed percentage positive values are above or below the expected based on historic trends.

Note: starting on report # 12, RFLP information is presented by year and not by year season.

Collaborators:

Iowa State University: Giovani Trevisan*, Leticia Linhares, Bret Crim; Poonam Dubey, Kent Schwartz, Eric Burrough; Rodger Main, Daniel Linhares**.

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

Kansas State University: Rob McGaughey, Jamie Henningson, Eric Herrman, Gregg Hanzlicek, Ram Raghavan, Douglas Marthaler.

South Dakota State University: Shivali Gupta, Jon Greseth, Travis Clement, Jane C. Hennings.

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** Daniel Linhares: Principal investigator. E-mail: linhares@iastate.edu.

Advisory Council:

The advisory group reviews the data to discuss it and provide their comments to try to give the data some context and thoughts about its interpretation: Clayton Johnson, Emily Byers, Hans Rotto, Mark Schwartz, Paul Sundberg, Paul Yeske, Pete Thomas, Rebecca Robbins, Tara Donovan, Matthew Turner.

This report is an abbreviated version of the dashboards that are available online.

To access the full data, use your computer, tablet, or phone to:

Power BI

1) Scan the code below, or go to: www.powerbi.com
2) Login: sdrs@iastate.edu
3) Password: Bacon 100
4) On the left bar, click on 'Apps'
5) Select your dashboard of interest (e.g. PRRS)
5) More information at the SDRS webpage
https://fieldepi.research.cvm.iastate.edu/swine-disease-reporting-system/

Swine Disease Reporting System

Page 1 – Detection of PRRSV RNA over time by rRT-PCR.

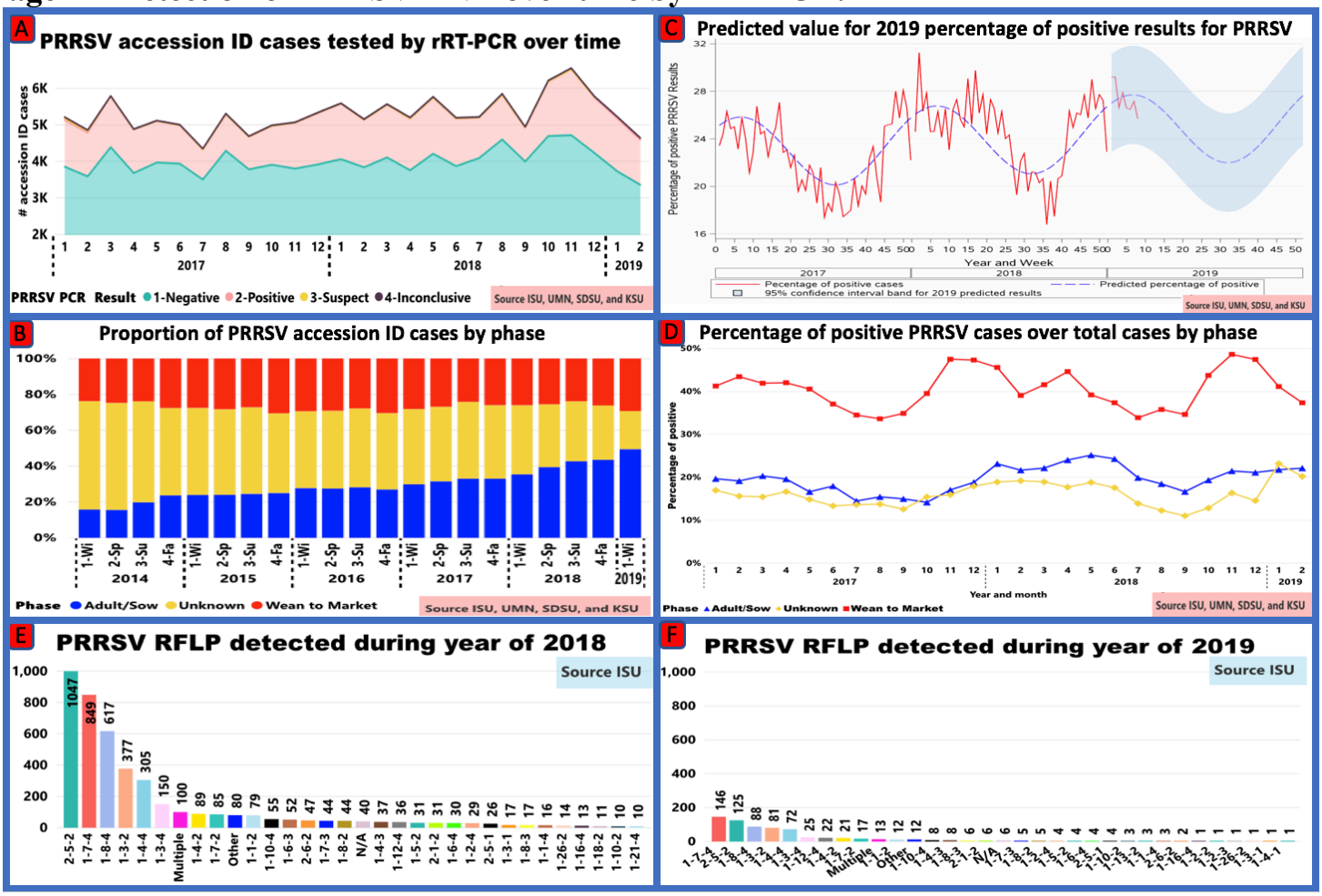


Figure 1. A: Results of PRRS rRT-PCR cases over time. **B**: Proportion of accession ID cases tested for PRRSV by age group per year and season. **C**: expected percentage of positive results for PRRSV RNA by rRT-PCR, with 95% confidence interval band for predicted results. **D**: percentage of PRRS 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. **E**: RFLP type detected during year of 2019. **F**: RFLP type detected during year of 2018. RFLPs indicated as N/A represents not detected or European PRRSV type.

SDRS Advisory Council highlights:

a) Number of monthly cases tested for PRRSV decreased since the peak of November of 2018. Based on comments from the advisory board, this is in agreement with perception that this PRRS season is relatively quiet in the field, and there is no reason to believe that this is going to change next month;

b) The detected PRRSV activity is within the predicted values for 2019;

c) Proportion of positive PRRSV cases in Adult/Sow for February, 22.07%, was very similar of January 21.75%;

d) Percentage of positive results in wean to market animals had decreased for the 3rd consecutive month;

e) RFLP type 1-74 is the most the most frequent detected in 2019, and was followed by RFLP 2-5-2, 1-8-4, and 1-3-2. This pattern of detection was very similar for the two first months of the year of 2018.

Page 2 – Detection of enteric coronaviruses by rRT-PCR

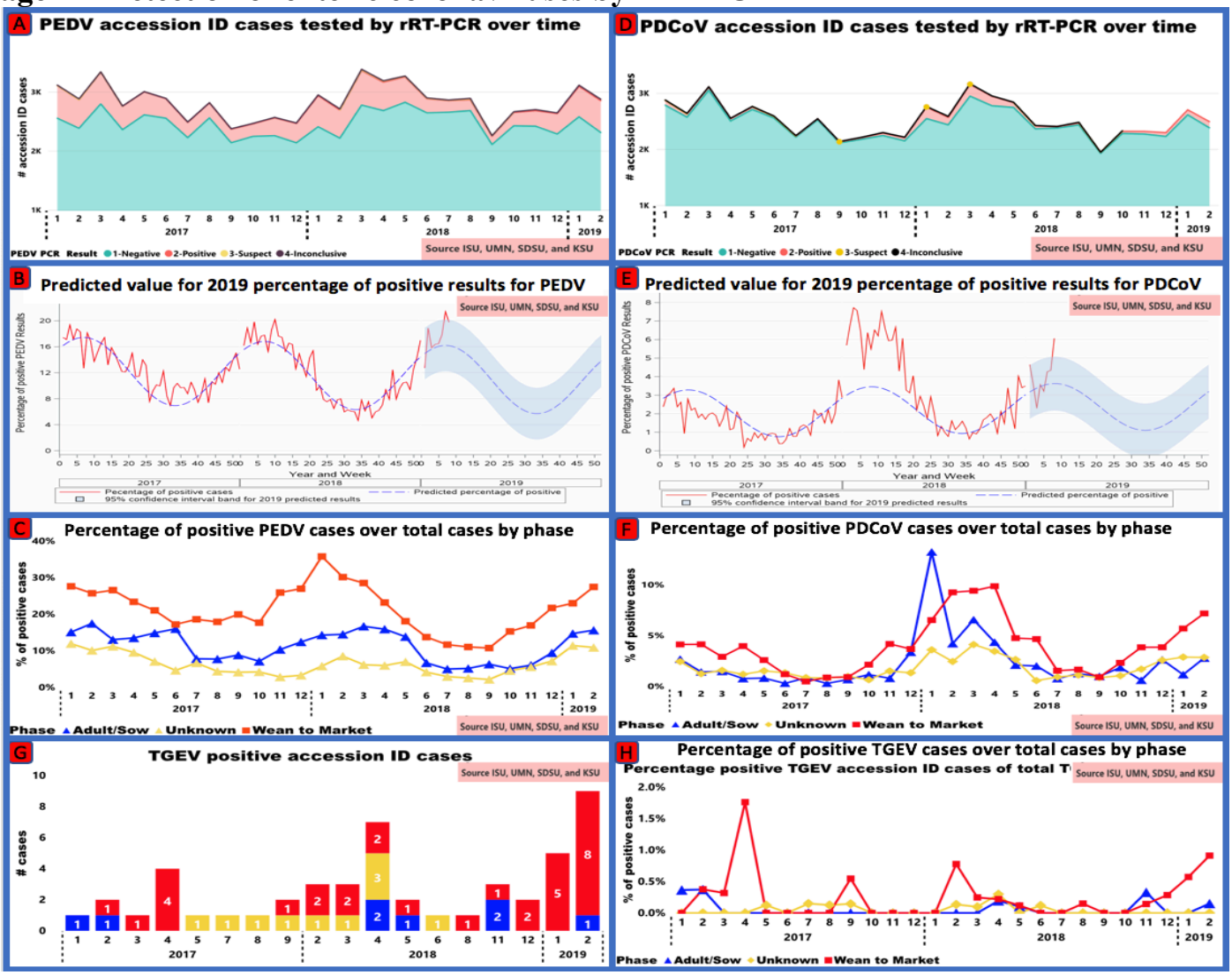


Figure 2. **A**: results of PEDV rRT-PCR cases over time. **B**: expected percentage of positive results for PEDV by rRT-PCR and 95% confidence interval for 2019 predicted value. **C:** percentage of PEDV PCR-positive results, by category over time. **D**: results of PDCoV rRT-PCR cases over time. **E**: expected percentage of positive results for PDCoV by rRT-PCR and 95% confidence interval for 2019 predicted value. **F:** percentage of PDCoV PCR-positive results, by age category over time. **G**: number of PCR-positive accession ID results of TGEV by age category. **H**: percentage of PCR-positive results for TGEV by age category. Each color represents one distinct age category.

SDRS Advisory Council highlights:

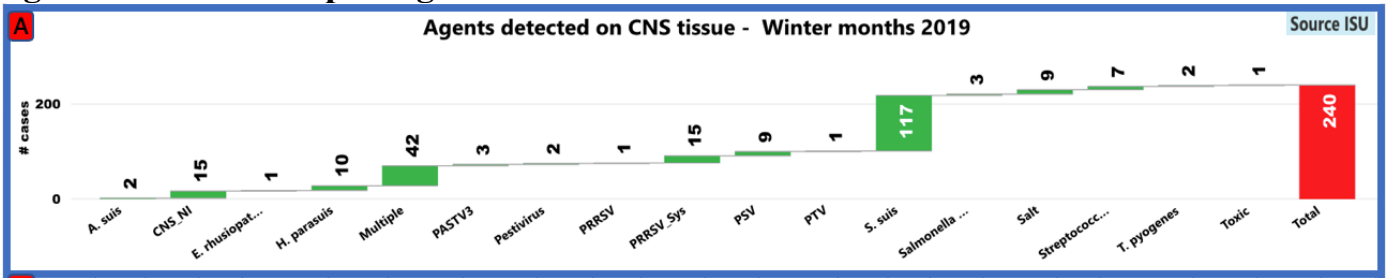
a) For the week 7 (10 to 16 of February), the level of detection of PEDV by PCR was above expected, and was driven by increased detection on wean to market animal category. During week 8 it returned to within predicted values;

b) For the week 8 (17 to 26 of February) the level of detection of PDCoV by PCR was above expected, and was driven by increased detection on wean to market animal category;

c) There were only 9 cases of TGEV positive results in February. New cases were detected in Iowa, Illinois, Indiana, and Georgia.

Page 3 – Detection of pathogens associated with CNS disease

A



B

	A. suis	CNS_NI	E. coli	E. rhusiopathiae	H. parasuis	Multiple	P. Enterovirus	PASTV3	PCV	Pestivirus	PRRSV	PRRSV_Sys	PSV	PTV	S. suis	Salmonella sp.	Salt	Streptococcus sp.	T. pyogenes	Toxic	Total
Winter months 2017	1	3	1		7	13	1		1			12			102	1	7	1	3		153
Winter Months 2018	1	19		1	10	27	3	1	2	3		15	8	1	131	1	4	6	4		237
Winter months 2019	2	15		1	10	42		3		2	1	15	9	1	117	3	9	7	2	1	240

Figure 3. Pathogen detection on CNS tissue over time. Each green bar indicates a different agent or syndrome, the red bar accounts for the sum of the green bars. **A:** winter months of 2019. **B**: Table for agents detected in CNS tissue during winter months of 2017, 2018 and 2019. Winter months contains results of December, January, and February. 'Multiple agents' represent cases with more than one pathogen detected on CNS tissues.

SDRS Advisory Council highlights:

a) Winter season of 2019 had similar pattern of detection for CNS agents from previous years and winter seasons;

b) Winter months of 2019 had 9 cases diagnosed as salt intoxication. This was the highest number of cases when compared with Winter months of 2018, and 2017;

c) Multiple combination of detection was mostly of: *Streptococcus suis, Tuerperella pyogenes*, *Salmonella sp,* and/or *Haemophilus parasuis*;

Page 4 – Detection of pathogens in respiratory tissue over time.

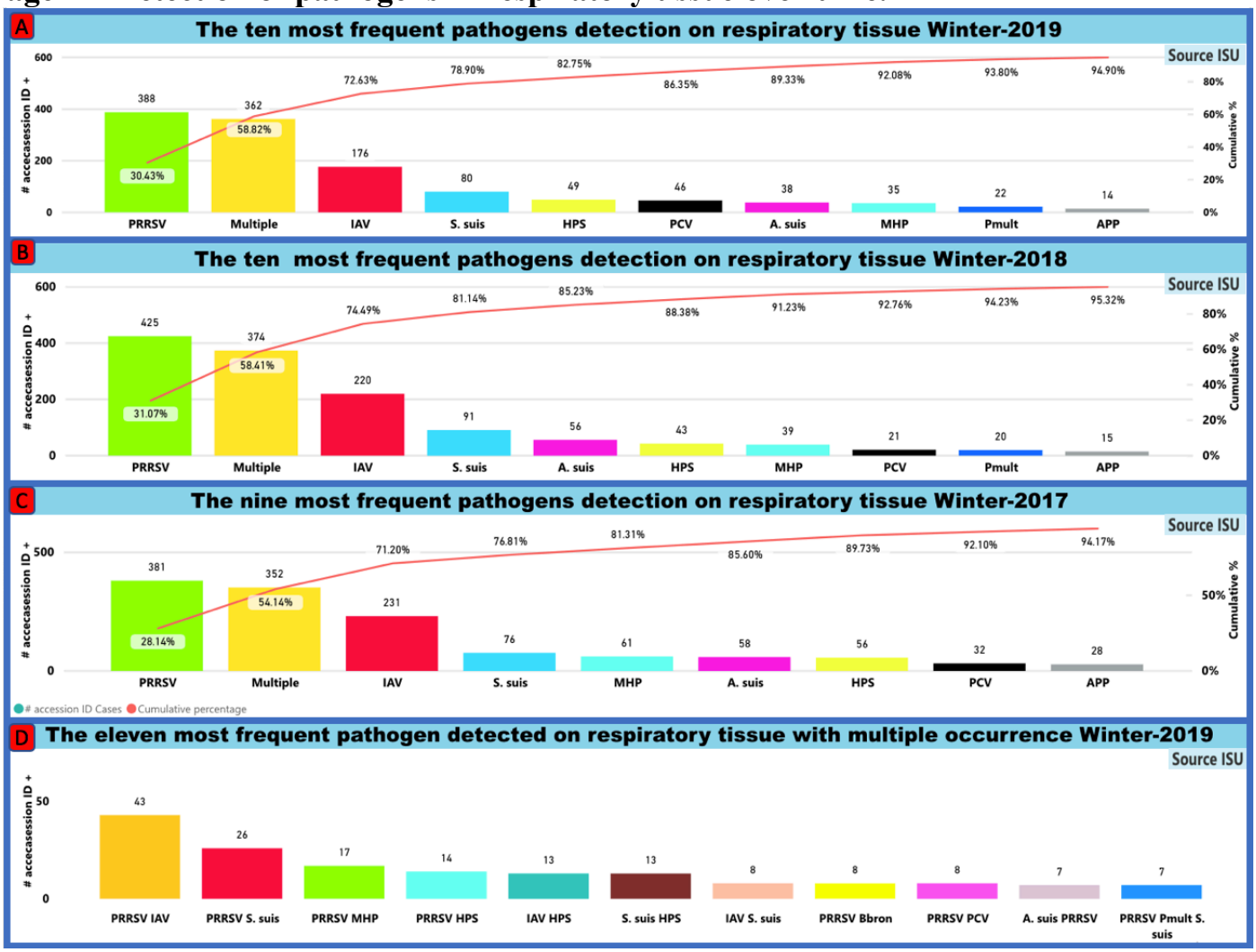


Figure 4. Pathogen detection on respiratory tissues over time. **A**, **B**, and **C** each bar and color indicate a different agent or syndrome. The red line accounts for the cumulative percentage of the bars. **A**: winter months of 2019. **B**: winter months of 2018. **C**: winter months of 2017. Winter months include December, January, and February. 'Multiple agents' represent cases with more than one pathogen detected on respiratory tissues**. D:** Multiple agents detected in respiratory tissue per accession ID case level. Each bar and colour bar represent a combination of 2 or more agents. Presented results are based on diagnostician interpretation.

SDRS Advisory Council highlights:

a) PRRSV and Influenza A (IAV) were still the major agents diagnosed as respiratory insulter;
b) For Winter season of 2019 there was an increase in diagnoses of *Haemophilus parasuis* (HPS) and Porcine Circoviruses (PCV - PCV2 and 3 combined)) as respiratory insulter, when compared with Winter of 2018, and 2017;
c) 90.90% (10 of 11) of the scenarios where multiple agents (Fig 4-D) were detected as respiratory insulants had PRRSV and/or IAV as one of the insulters.

Page 5 – Detection of pathogens in enteric tissue over time.

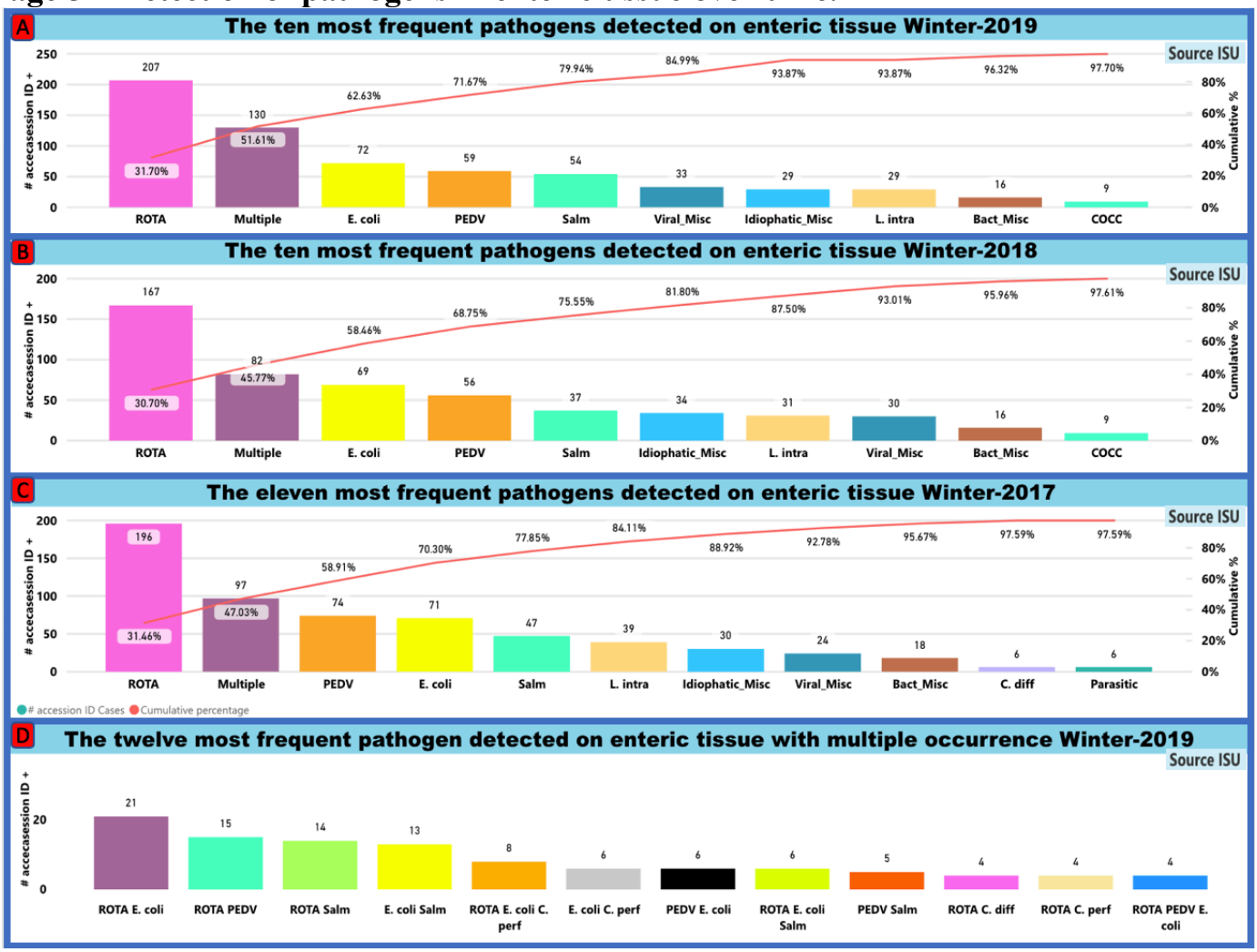


Figure 5. Pathogen detection on enteric tissues over time. **A**, **B**, and **C** each bar and color indicate a different agent or syndrome. The red line accounts for the cumulative percentage of the bars. **A**: winter months of 2019. **B**: winter months of 2018. **C**: winter months of 2017. Winter months include December, January, and February. 'Multiple agents' represent cases with more than one pathogen detected on respiratory tissues**. D:** Multiple agents detected in enteric tissue per accession ID case level. Each bar and colour represent a combination of 2 or more agents. Presented results are based on diagnostician interpretation.

SDRS Advisory Council highlights:

a) Rotaviruses (ROTA) and *Escherichia coli* (E. coli) continue to be diagnosed as the major enteric insulants when compared with Winter months of 2018, and 2017.

b) The most frequent insulters diagnosed as multiple in enteric tissue (Fig 5-D) during winter months of 2019 where composed by different combinations involving ROTA, E.coli, PEDV, salmonellosis (Salm), i. e. representing multiple combination of the major individual insulters.

Bonus page

Mycoplasma hyopneumoniae historic information is now on SDRS

SDRS is proud to present *Mycoplasma hyopneumoniae* (MHP) PCR results. A total of 66,862 accession ID cases between January 2010 and February 2019 have been aggregated from the four participants VDL`s.
The main findings for MHP information are:

- Number of cases tested for MHP has gradually increased over time (Fig 1), and Fall months consistently had higher number of cases tested for MHP over time.
- Bronchial swab, lung, and oral fluid are the major specimens submitted for MHP PCR (Fig 2).
- Samples coming from wean to market represented 54.63% (36,529) of all tested cases (Fig 3);
- There was an apparent cyclic pattern of detection where Spring months had lower and Fall months had higher percentage of positive results over time (Fig 4X). This cyclic pattern of detection was driven by samples from wean-to-market pigs.

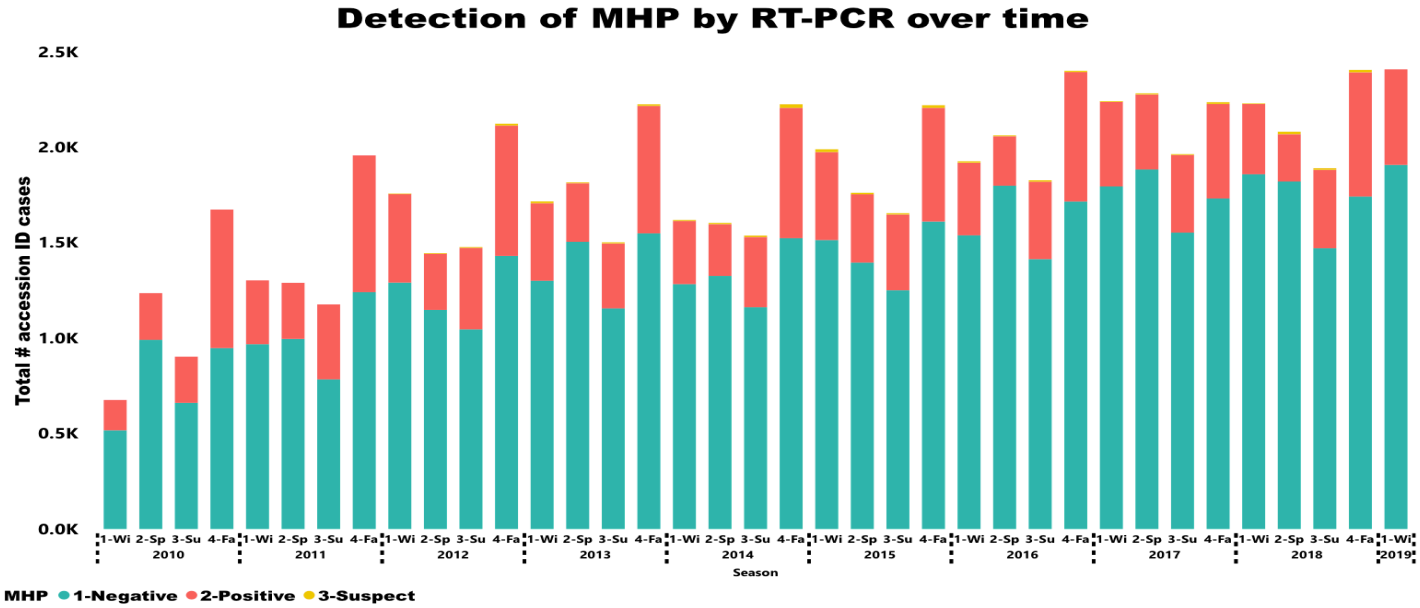


Figure 1: Column chart with results of MHP cases tested by PCR over time. Each bar represents a season within a year. Each color represents a test result, as indicated in the bottom section of the chart. Seasons are represented as follows: 1-Wi = Winter; 2-Sp = Spring; 3-Su = Summer, and 4-Fa = Fall.

Figure 2: Proportion of sample types submitted for MHP for PCR testing over time. Each color represents a specimen. The three most frequent specimens and proportion are labelled in the figure.

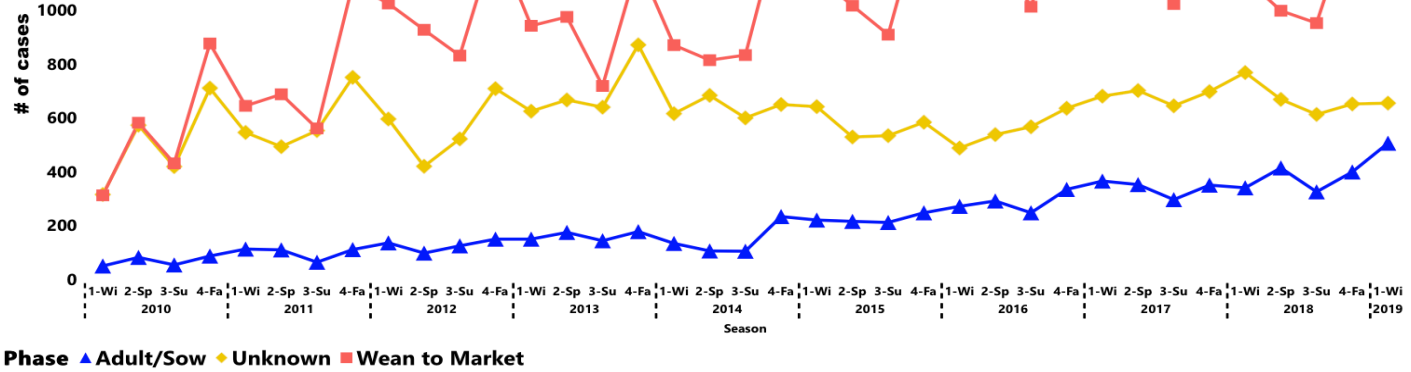


Figure 3: Line chart with results of MHP cases tested by PCR over time per production phase.

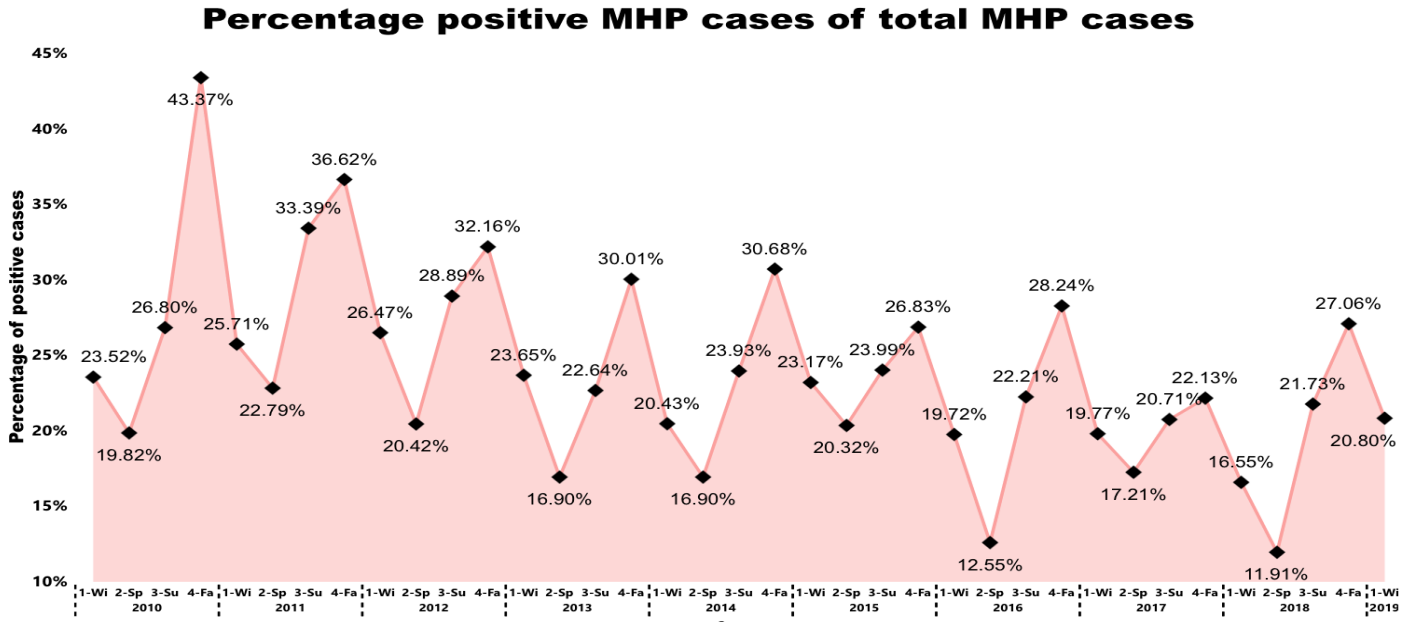


Figure 4: Area chart for the percentage of PCR-positive results for MHP cases over the total number of accession ID cases per season. Each point represents a season within a year. Seasons are represented as follows: 1-Wi = Winter; 2-Sp = Spring; 3-Su = Summer, and 4-Fa = Fall.