**Title:** Monitoring ISU VDL data for signs of emerging diseases - **#18-192 IPPA**

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**Scientific Abstract:** Veterinary diagnostic laboratories (VDLs) are continuously receiving swine case submissions and samples for testing. The use of diagnostic information for monitoring analyte detection and disease diagnosis is useful to understand the macro-epidemiological aspects associated with the megatrends of agent detection and disease diagnosis. We developed models to 1) monitor the number of monthly porcine submissions received at the ISU VDL); 2) monitor and predict the cyclic pattern of nucleic acid detection of PRRSV, PEDV, and PDCoV and MHP by PCR testing from case submissions originating from farms located in Iowa that are being reported to the Swine Disease Reporting System (SDRS) project; and 3) monitor the number of cases with the different types of disease diagnosis being derived from tissue-based (sick-pig) diagnostic cases submissions processed at the ISU VDL. To monitor monthly submissions at the ISU VDL, 5 years of historical data (2014-2018) composed by the monthly counts of porcine submissions were used to fit an additive Winters model with logistic transformation using the PROC ESM procedure available in the SAS software. The findings were used to forecast the expected number of monthly porcine submissions to the ISU VDL, with a 95% confidence interval (CI), for 2019. To monitor the cyclic pattern of detection of PRRSV, PEDV, PDCoV, and MHP information reported to the SDRS project, a cyclic regression model was applied to the information for cases from the state of Iowa. Historical data (2016-2018) composed by the weekly percentage of PCR-positive submissions, for each of the agents, were used to fit a cyclic robust regression model using the PROC ROBUSTREG procedure available on SAS. The findings were used to forecast the expected weekly percentage of PCR-positive submissions, with a 95% CI, for 2019. To monitor weekly counts of disease diagnosis at ISU VDL a 7-week window composed by the previous weekly counts of diagnosis by system or agent was used to fit an EARS-C1 algorithm using the R software, for 2019. The findings were used to monitor the upcoming weekly counts of diagnosis based on three standard deviations from the mean counts of the previous 7-week window.

During 2019: The number of porcine submissions received at ISU-VDL was above expected in May and October. The proportion of PRRSV-positive submissions crossed 95% CI boundaries at weeks 45-49. The proportion of PEDV-positive submissions crossed 95% CI boundaries at weeks 2, 6, 8, 12, 16, 25, 34, 47, 50. The proportion of PDCoV-positive submissions crossed 95% CI boundaries at weeks 7-8, 10-12, 15, 18, 24, 45-47, 49- 50. Different weeks had signals for an increased number of diagnoses for each of the eight monitored systems or one or more of the 20 monitored endemic agents.

Results from the model described herein and web-based systems being established to summarize and share such information present as a promising new development for keeping veterinarians and producers more informed about trends and signals of out-of-normality occurring in the findings of swine health related diagnostic work. Monitoring

SDRS information was able to assess the seasonal cyclic patterns of PRRSV, PEDV, PDCoV, and MHP detection using the test results reported to the SDRS by multiple VDLs. When facing signals for increased agent detection, veterinarians and producers can reinforce biosecurity compliance measures as a way to prevent the potential spread of the agents.