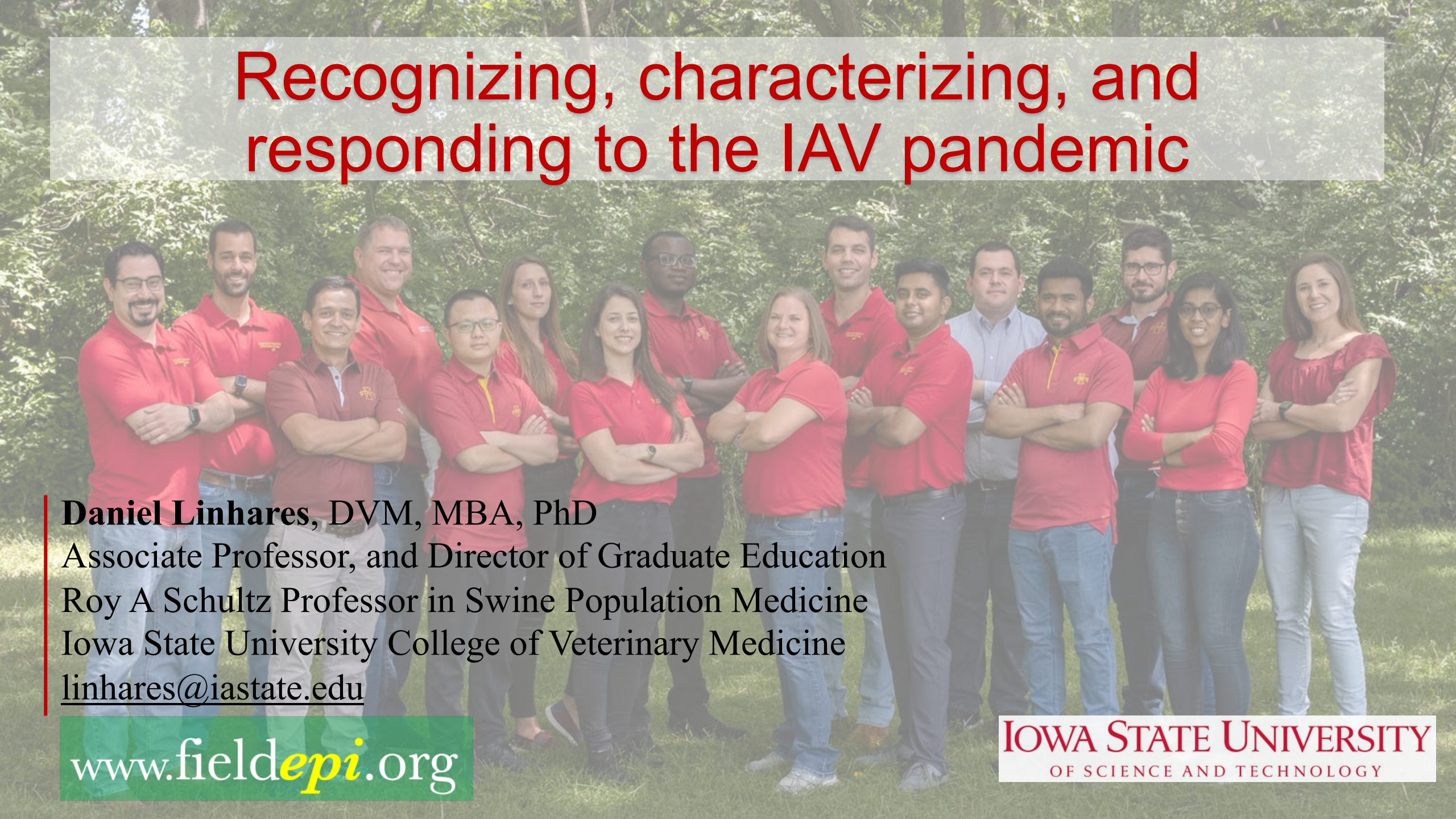# Recognizing, characterizing, and responding to the IAV pandemic

Daniel Linhares, DVM, MBA, PhD
Associate Professor, and Director of Graduate Education
Roy A Schultz Professor in Swine Population Medicine
Iowa State University College of Veterinary Medicine
linhares@iastate.edu

www.field*epi*.org

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Influenza A virus monitoring:

SDRS
SWINE DISEASE REPORTING SYSTEM
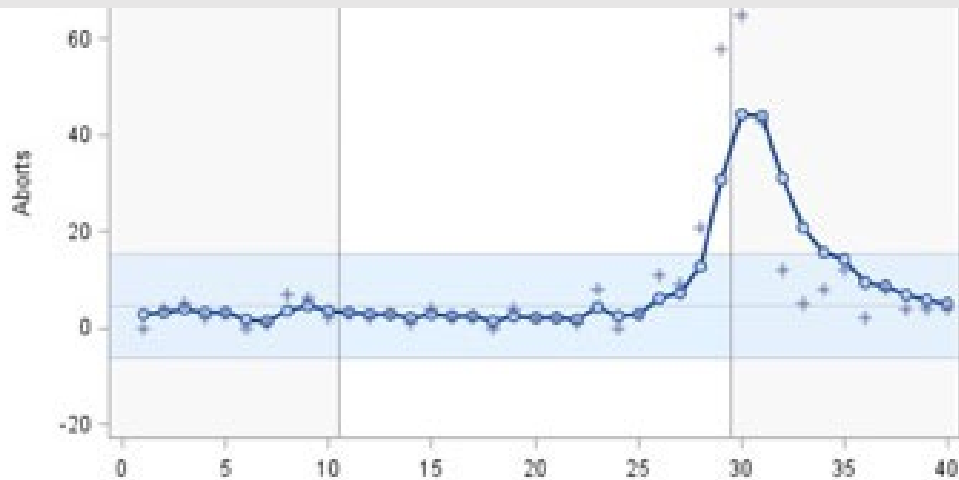
www.field*epi*.org/*SDRS*

Tracking incidence of bacterial disease

IOWA STATE UNIVERSITY
Veterinary Diagnostic Laboratory

Diagnostic codes system

Farm-level monitoring & control:
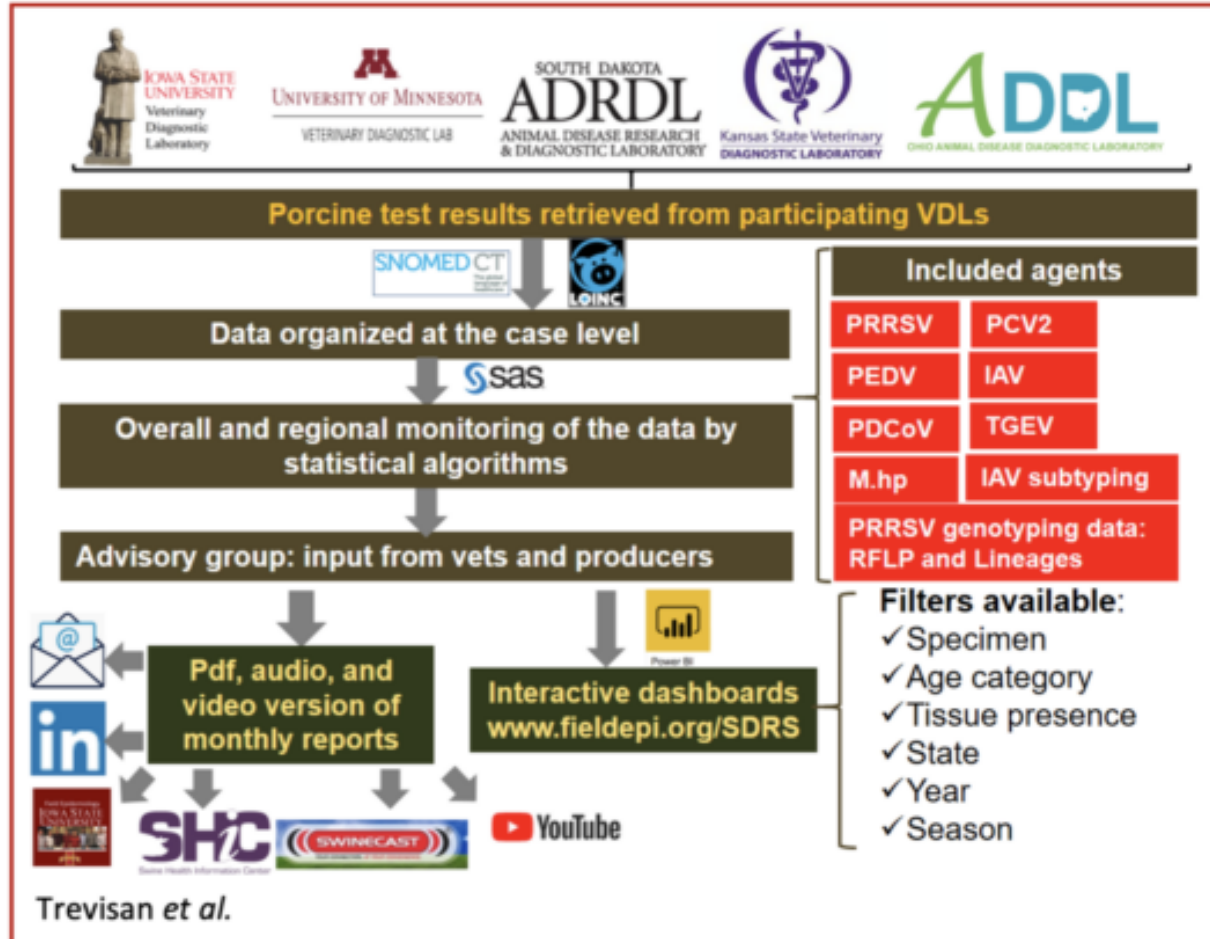
Pathogen response:

Next Generation of Voluntary PRRS Virus Regional Control Programs

Edison S. Magalhães[1]*, Jeffrey J. Zimmerman[1], Derald J. Holtkamp[1], Dyneah M. Classen[2], Douglas D. Groth[2], Lauren Glowzenski[3], Reid Philips[4], Gustavo S. Silva[1] and Daniel C. L. Linhares[1]

[1] Department of Veterinary Diagnostic and Production Animal Medicine, College of Veterinary Medicine, Iowa State University, Ames, IA, United States, [2] Carthage Veterinary Service, Ltd., Carthage, IL, United States, [3] TriOak Foods Inc., Oakville, IA, United States, [4] Boehringer Ingelheim Animal Health USA Inc., Atlanta, GA, United States

A collaborative project across leading US swine-centric VDLs

Domestic disease monitoring program: collaboration between USA VDLs:

Porcine test results retrieved from participating VDLs

Data organized at the case level

Overall and regional monitoring of the data by statistical algorithms

Advisory group: input from vets and producers

Pdf, audio, and video version of monthly reports

Interactive dashboards www.fieldepi.org/SDRS

Included agents

PRRSV	PCV2
PEDV	IAV
PDCoV	TGEV
M.hp	IAV subtyping

PRRSV genotyping data: RFLP and Lineages

Filters available:
- ✓ Specimen
- ✓ Age category
- ✓ Tissue presence
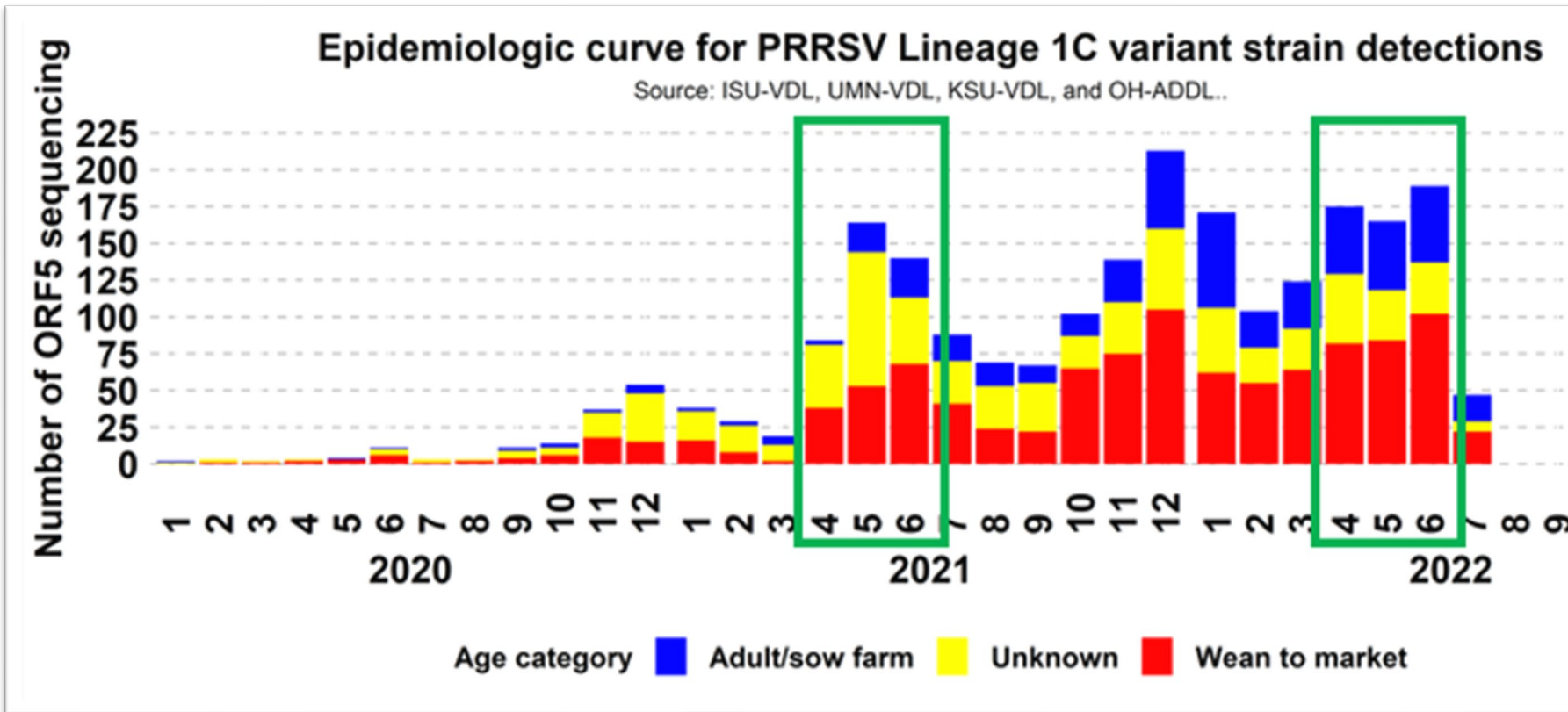- ✓ State
- ✓ Year
- ✓ Season

Trevisan et al.

VDL-specific projects: further describing pathogen detection in the USA swine industry

- **Disease Diagnosis System**
  - > Respiratory
  - > Digestive
  - > Systemic
  - > Nervous
  - > Urogenital
  - > Integument
  - > Musculoskeletal
  - > Other syndromes
- **PRRS virus RFLP report**
- **Influenza A virus monitoring**
- **Alert systems**

www.fieldepi.org/SDRS

Supporting the U.S. swine industry during crisis events: tracking emerging PRRSV strains (RFLP 1-4-4 L1C variant)

Epidemiologic curve for PRRSV Lineage 1C variant strain detections
Source: ISU-VDL, UMN-VDL, KSU-VDL, and OH-ADDL..

← We can track the IAV epi curve, reporting it by:
- Age group
- Production phase
- State
- Time (day or week)

www.fieldepi.org/SDRS

Visualization of IAV activity over space & time

Legend ● 2-3 STD above baseline ● 2-3 STD below baseline ● 3+ STD above baseline ● 3+ STD below baseline ● Within +/- 2 STD of baseline

Monitoring percent of positive over all cases (January)
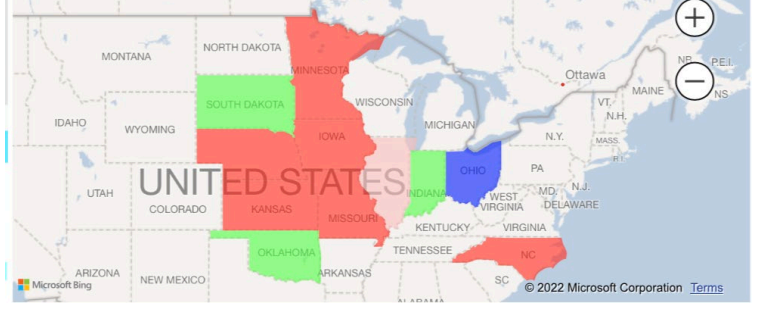
Monitoring percent of positive over all cases (February)
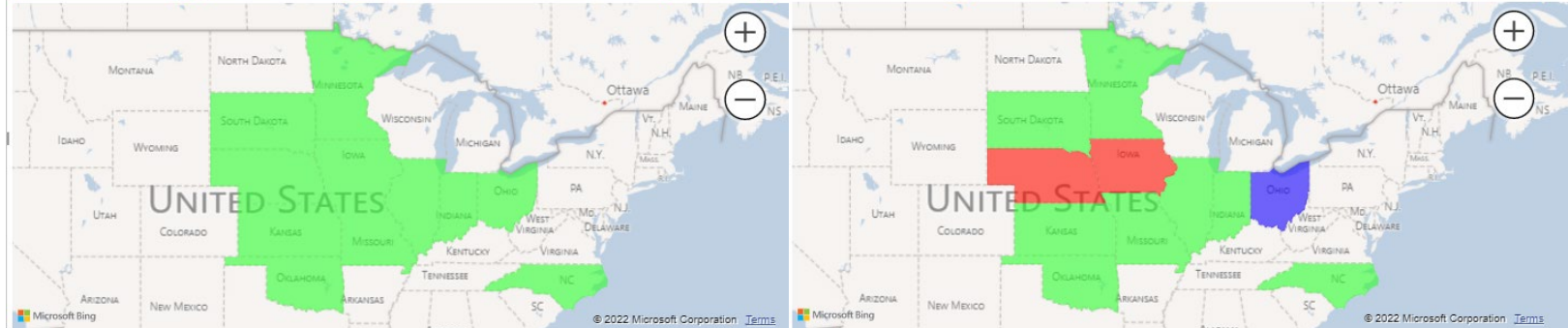
Monitoring percent of positive over all cases (March)
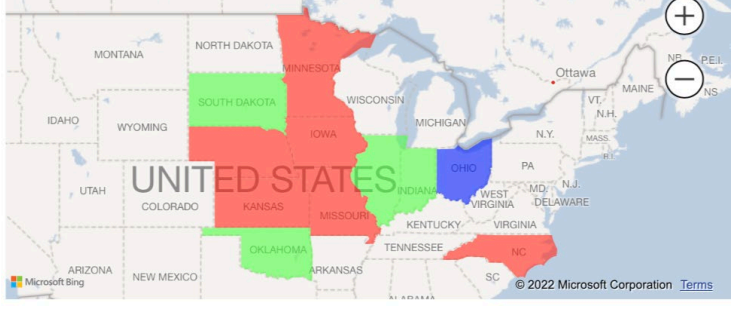
Monitoring percent of positive over all cases (April)
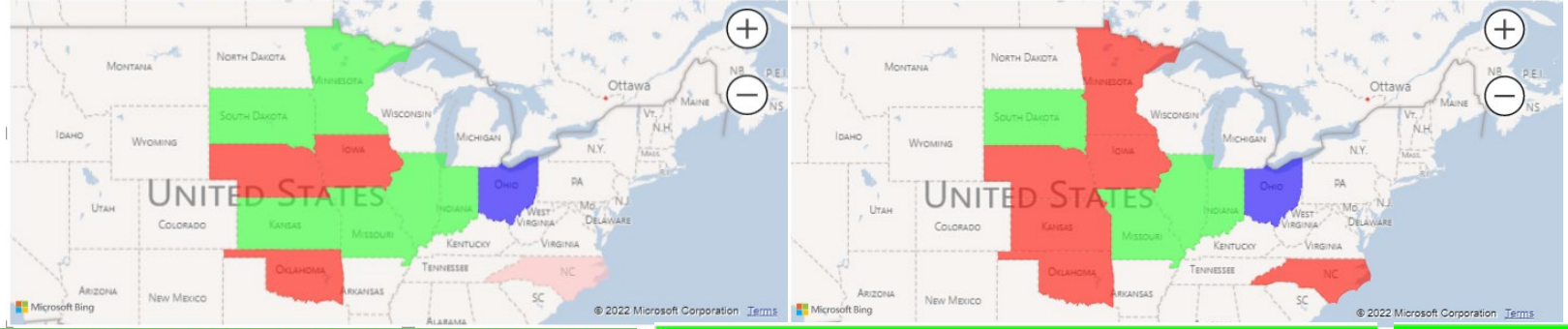
Monitoring percent of positive over all cases (May)
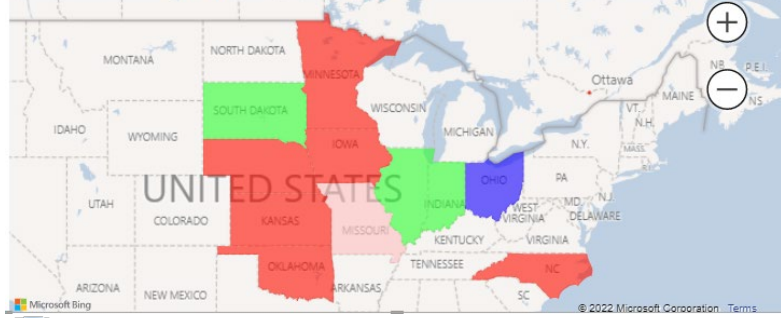
Monitoring percent of positive over all cases (Jun)

Monitoring percent of positive over all cases (Jul)

This is a PEDV (enteric coronavirus affecting pigs) example: USA, 2022

www.fieldepi.org/SDRS

Monitoring of **disease diagnosis (diagnostic codes at ISU)** over time, age group, farm type, US state

www.field**epi**.org

Weekly monitotoring of diagnostic codes

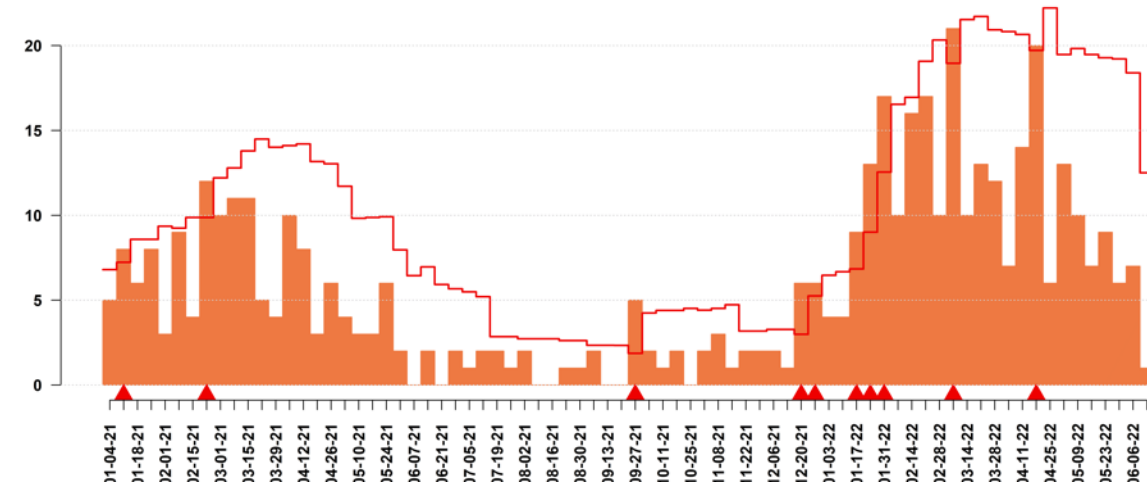Respiratory system
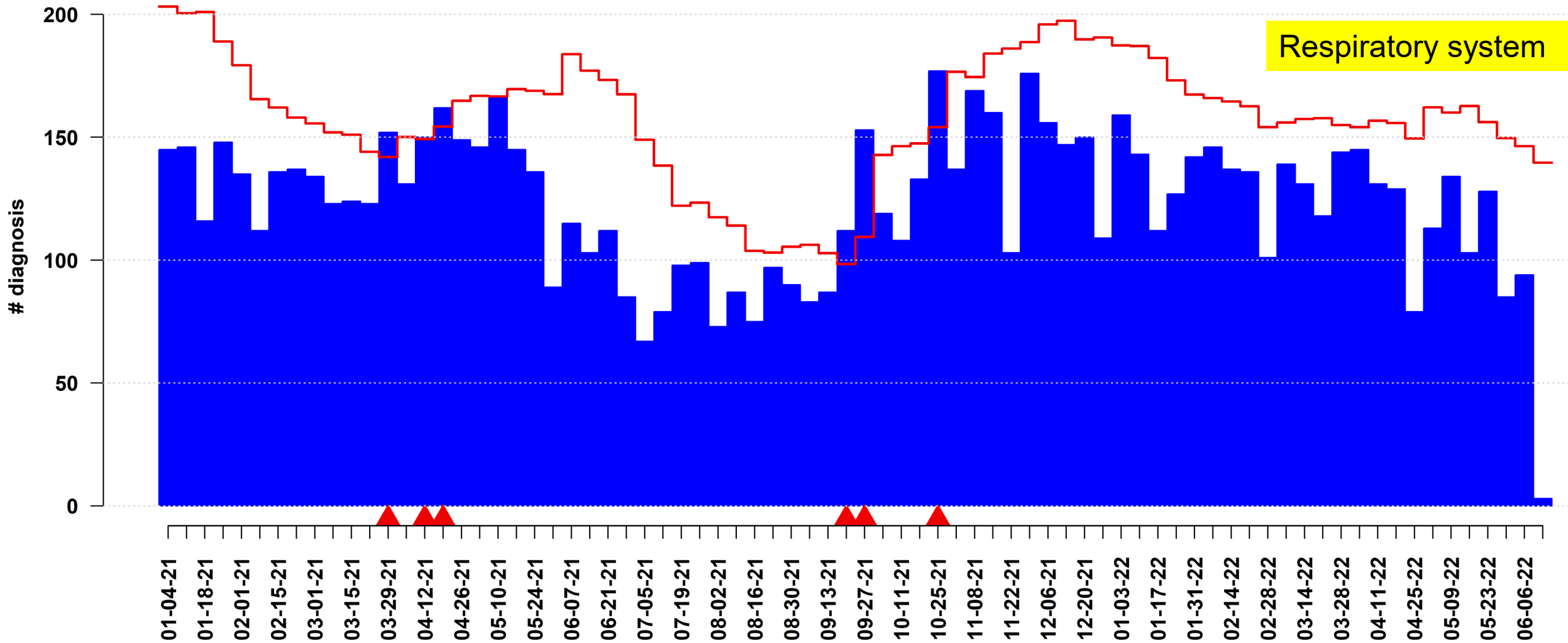
Weekly monitoring of disease diagnosis: works for any disease!

Influenza A virus
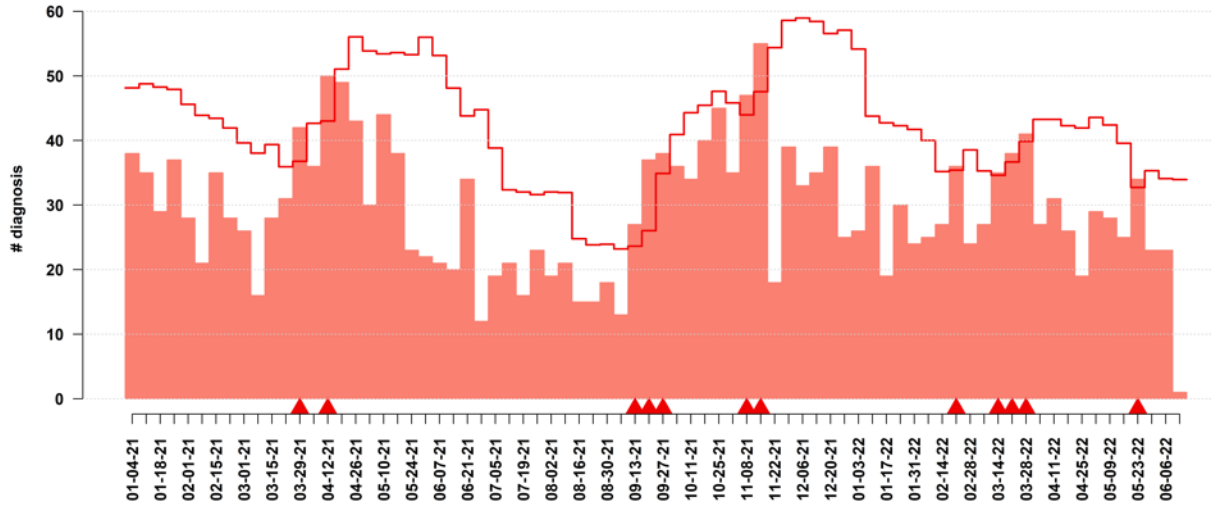
PEDV

Coccidiosis

E. coli

www.field*epi*.org/SDRS
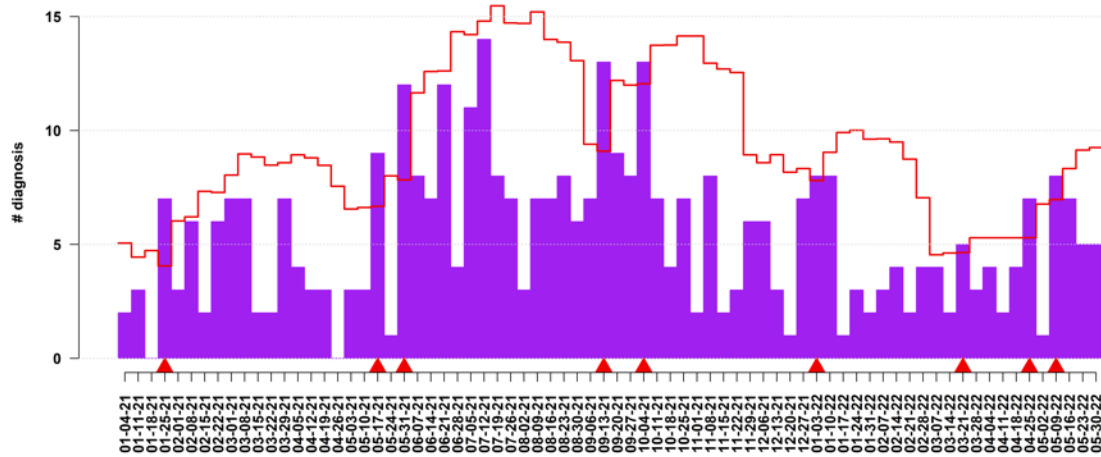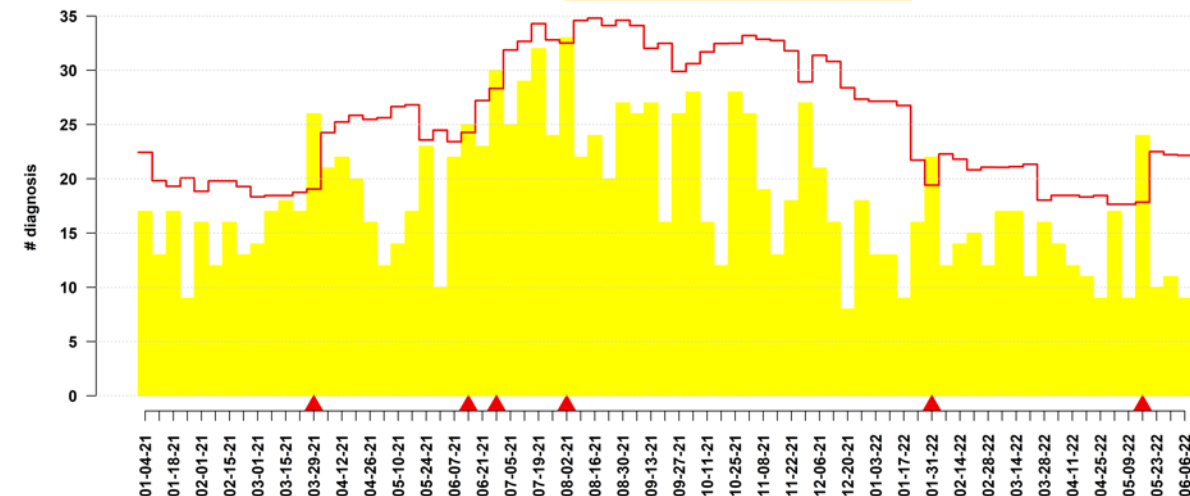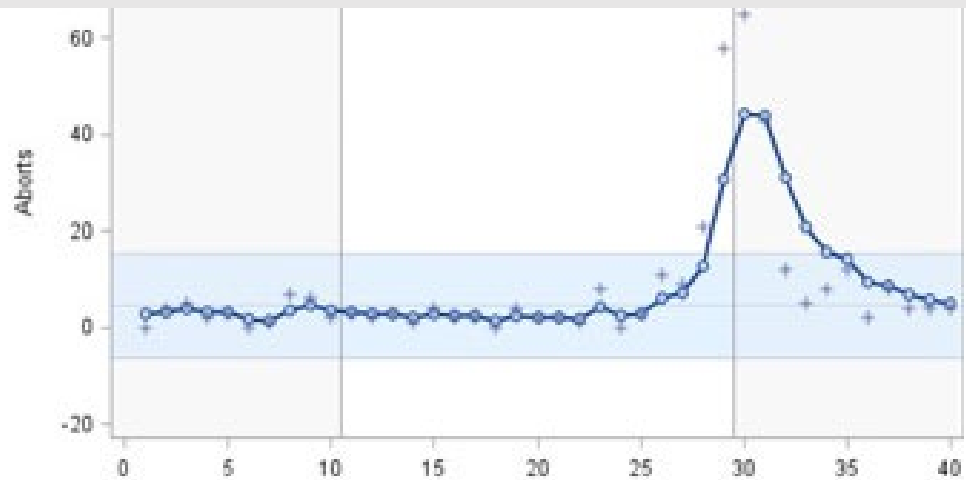
Farm-level monitoring & control:

Implementation of ongoing automated monitoring of clinically relevant indicators of disease activity (pig mortality, abortions, feed & water disappearance)

From early detection to control

Biocontainment (==reducing shed & spread of IAV between farms==):

- **Herd immunization**
  - Significantly reduce the duration and magnitude of viral shedding
  - Break the transmission cycle, controlling the infection in herds
- **Flow of pigs and people based on test results**
  - Bio-management practices (i.e., hygiene, shower in-out)
- In short, practicing veterinarians have the knowledge and expertise to *manage Influenza A virus infection* in herds without depopulation!

From early detection to control

Coordinated IAV control & elimination efforts @ <mark>regional level</mark>

- Implementation of <u>contingency plans</u> based on routine monitoring and pressure of infection in the region.
  - Early identification of infected sites
  - Vet-to-vet communication
  - Adjust people/pig flow (shared labor, shared supplies, transportation of pigs, feed, and other resources)

Summary

SDRS-related projects: macro-epidemiological aspects of IAV & associated bacterial infections over time, space, age groups, farm type.

Farm-level tools for rapid response:

- Ongoing automated monitoring of clinically relevant indicators of disease activity (pig mortality, abortions, feed & water disappearance)

- Control of Influenza A virus from infected farms

- Alert systems, communications, and action plans at the regional level

Steps to implement this plan

Tracking IAV activity: we are ready

- Technically ready to go
- Agreement between participating labs & state & federal officers
- Financial support to increase active surveillance

Tracking antimicrobial resistance patterns

- Need to develop

Farm-level tools to identify and respond to IAV infection

- Technically ready to go
- Can be further improved with next-gen vaccines

Regional level disease control programs

- Technically ready to go
- Need to raise funds to support ongoing PCR-based monitoring (surveillance)
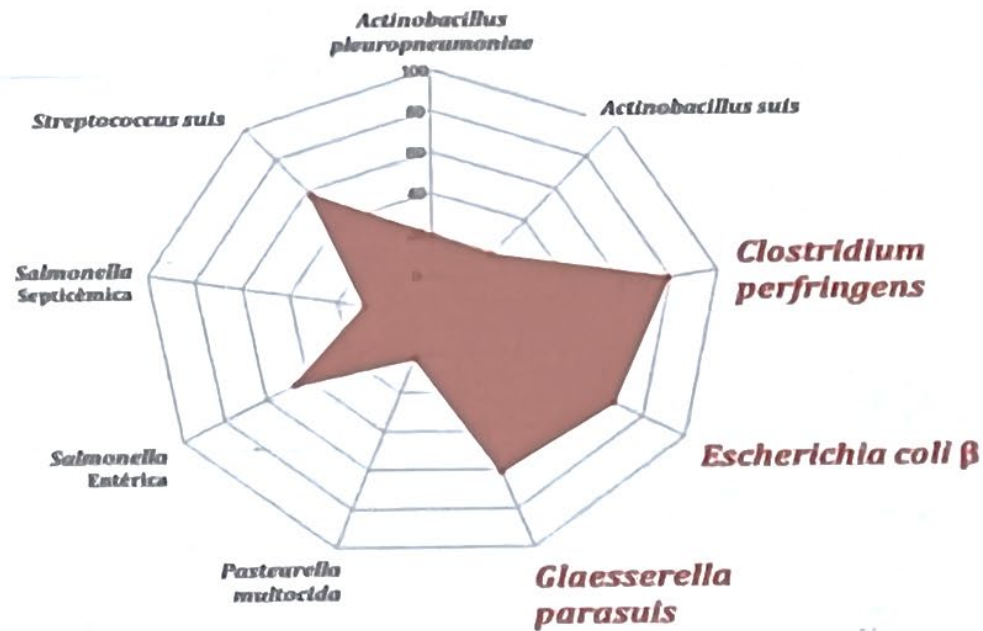
IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

www.fieldepi.org

Also possible (work in progress): monitoring of AMR patterns over time, region, age group, production phase.
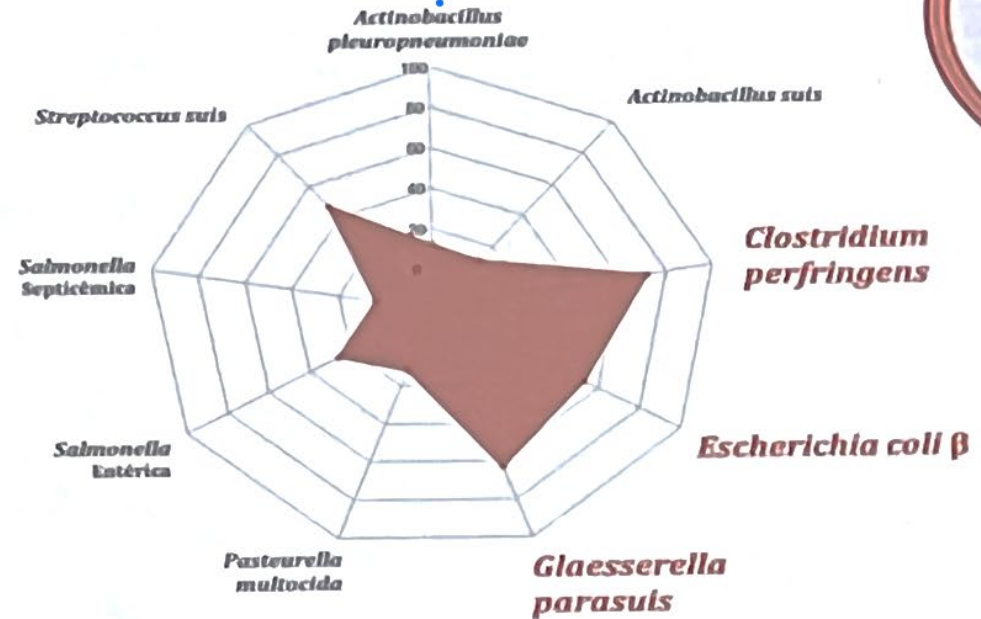

Fluoroquinolonas (isolados clínicos de 5 anos)