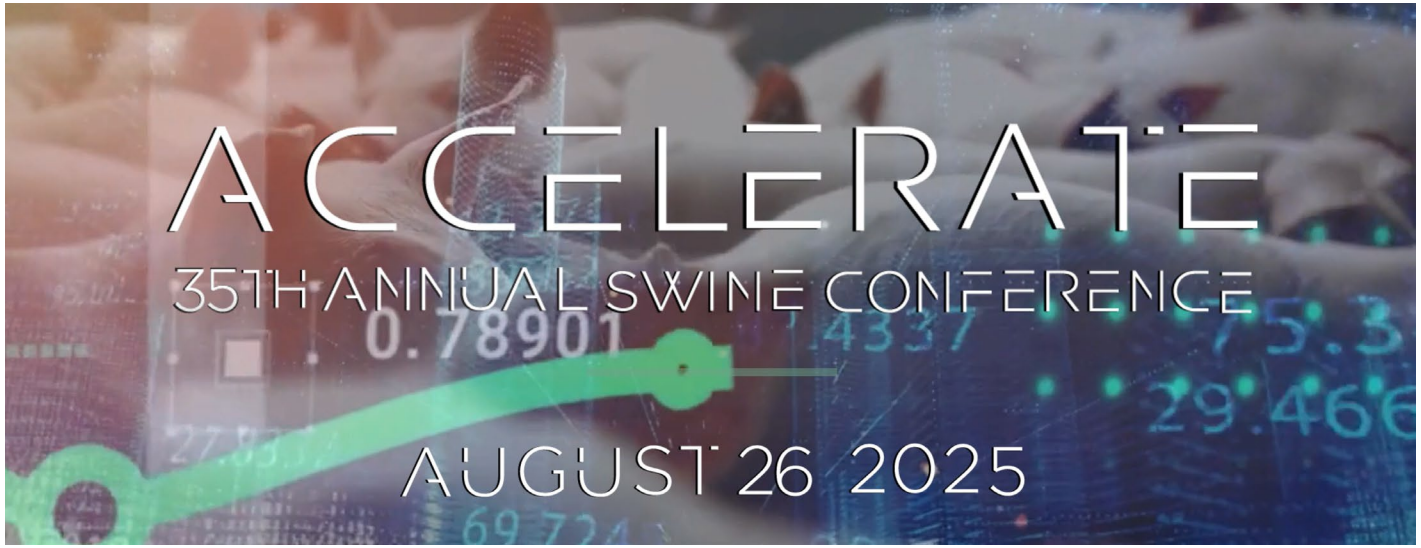
Making Sense of Field Data for Decision-Making

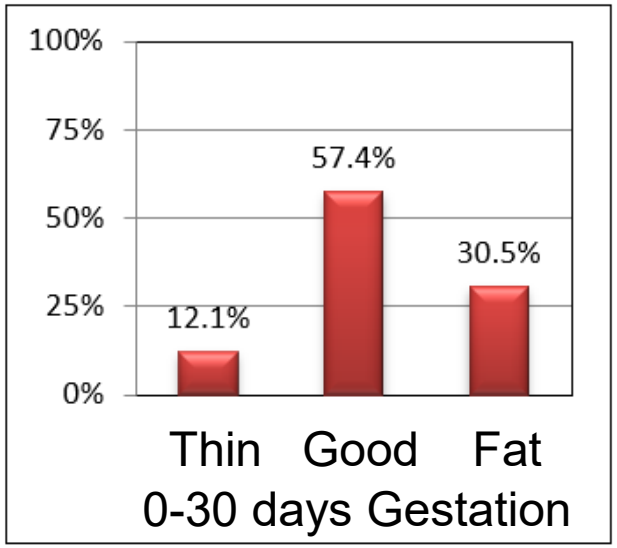
Edison Magalhães – DVM, MS, PhD

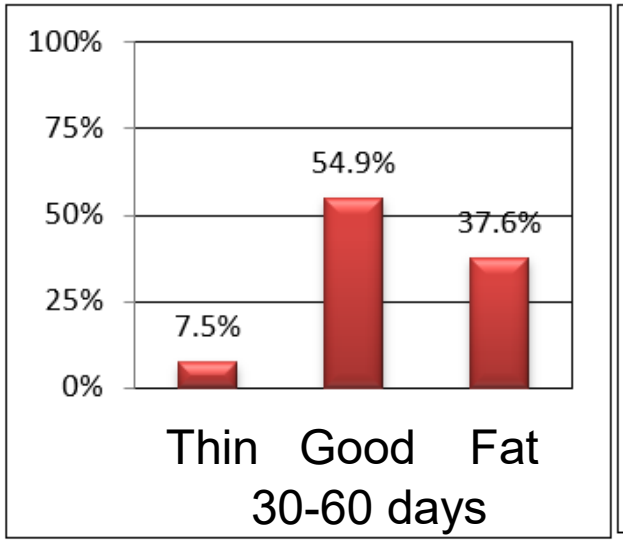
Assistant Professor – Department of Animal Science

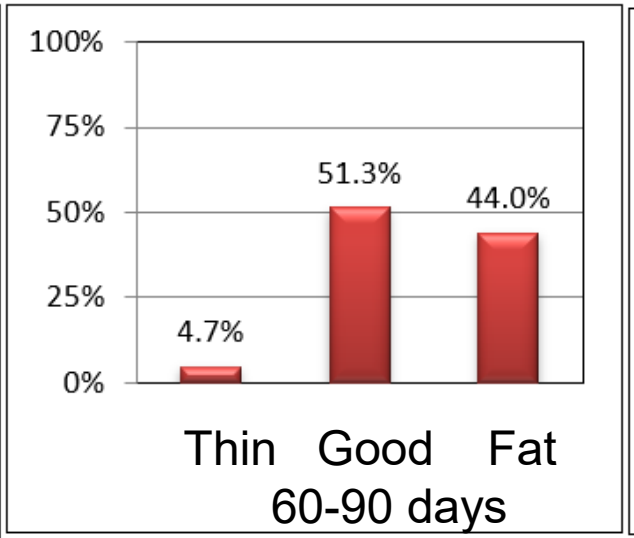
Iowa State University

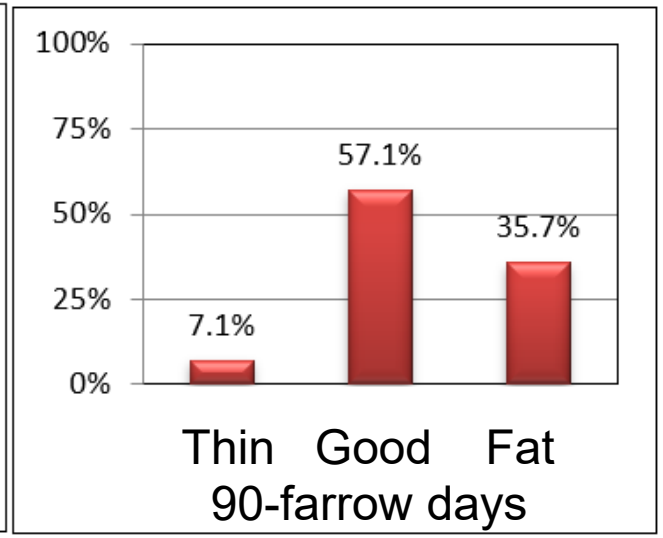


How data is being used today?









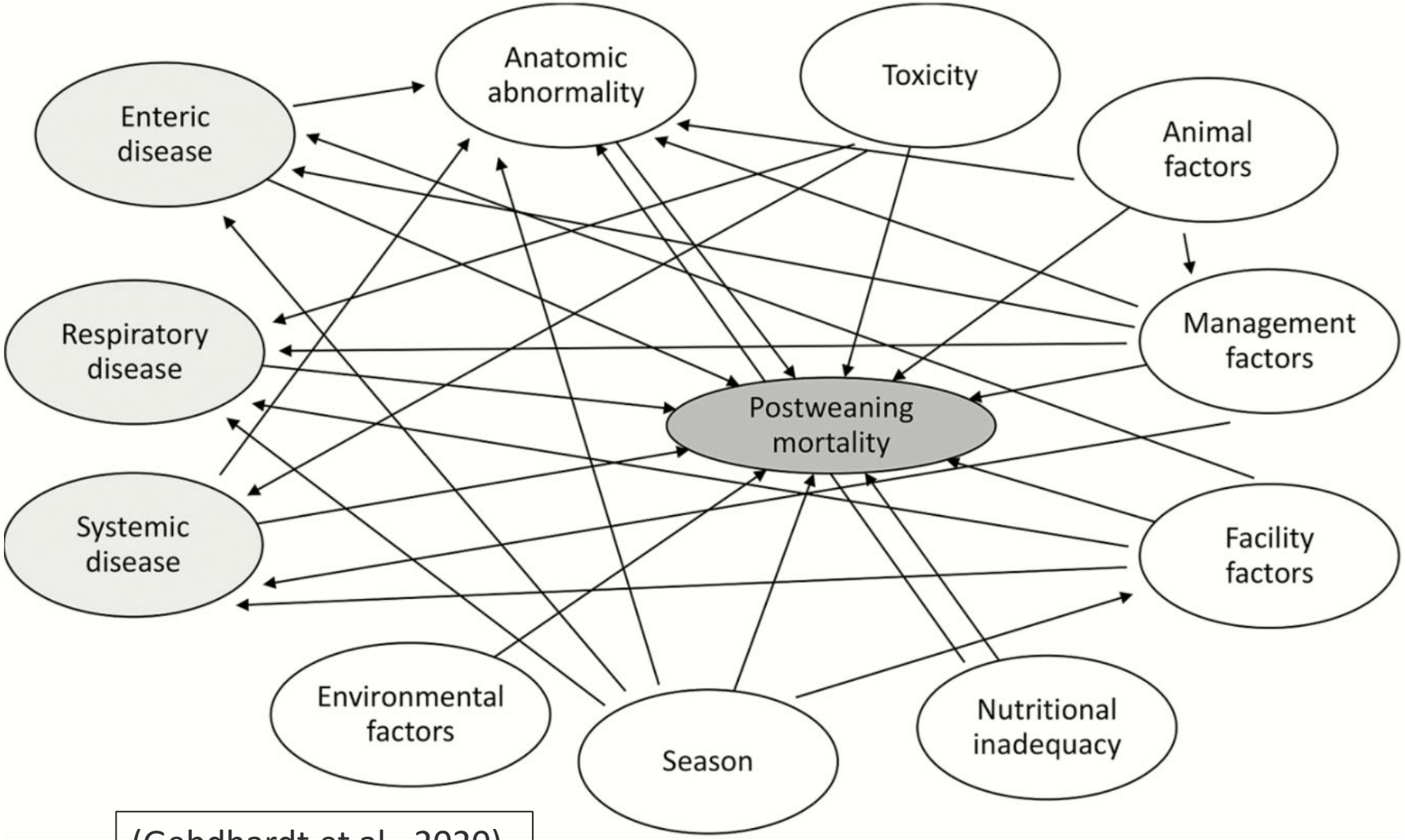
- A lot of descriptive statistics…
- A lot of “pivot tables”…
- Sometimes regression-based models (univariate)

Objective of using field data

- The objective of using field data is not to replace experimental studies insights but to take full advantage of data collected under our field conditions.

- What else can we do with observational data descriptive statistics?

Understand your data: relationships w/ your outcome



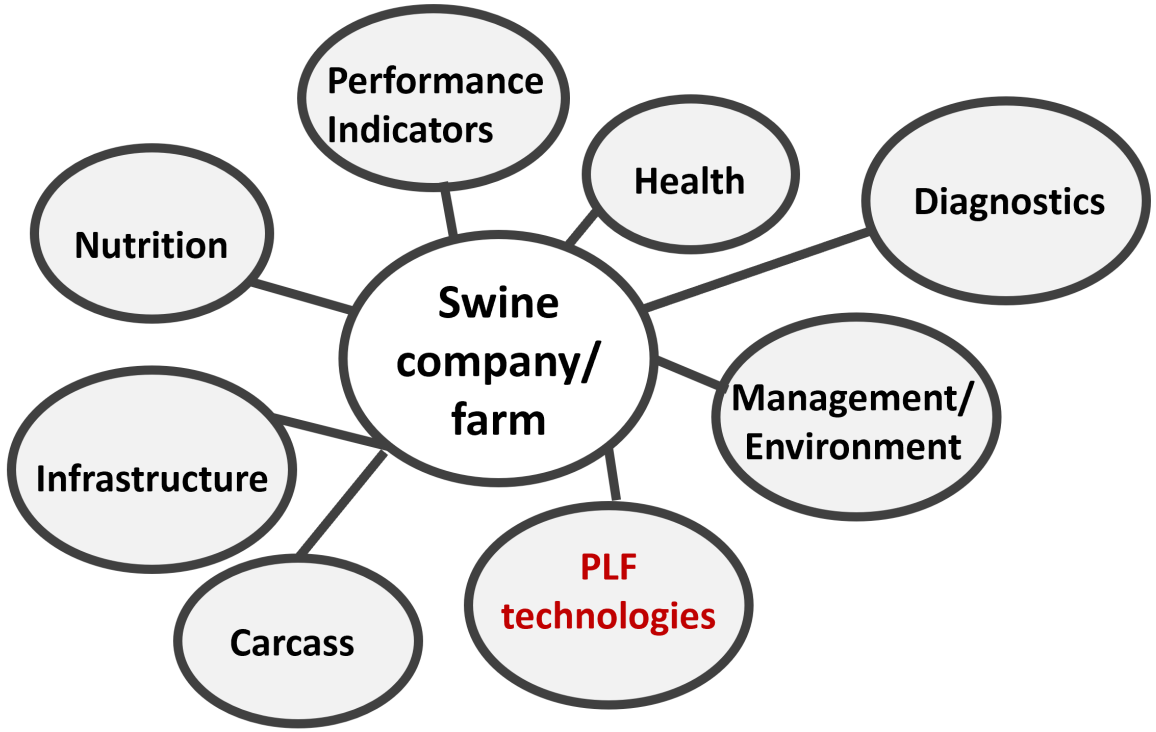
(Gebdhardt et al., 2020).

How do you design experimental studies around interactions?

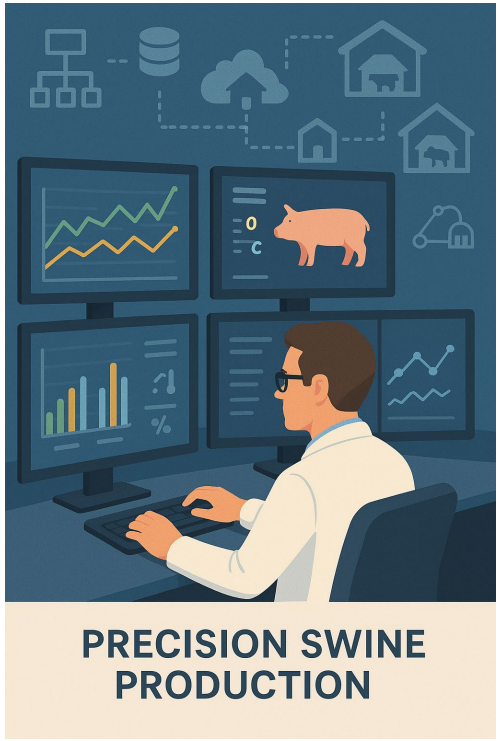
- PRRSv * IAV * GPS * S. suis * Mycoplasmas * weaning age * weaning weight * Parity sows weaned * season of the year * enteric challenges * stocking density * environmental factors * feed mill-related factors

How to get there?

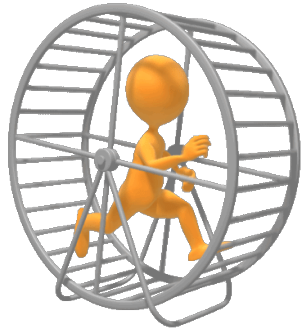
Critical need for near-real-time **big-data consolidation**, allowing **interactive analysis** of swine data and the application of precision swine health and productivity management.



Machine Learning

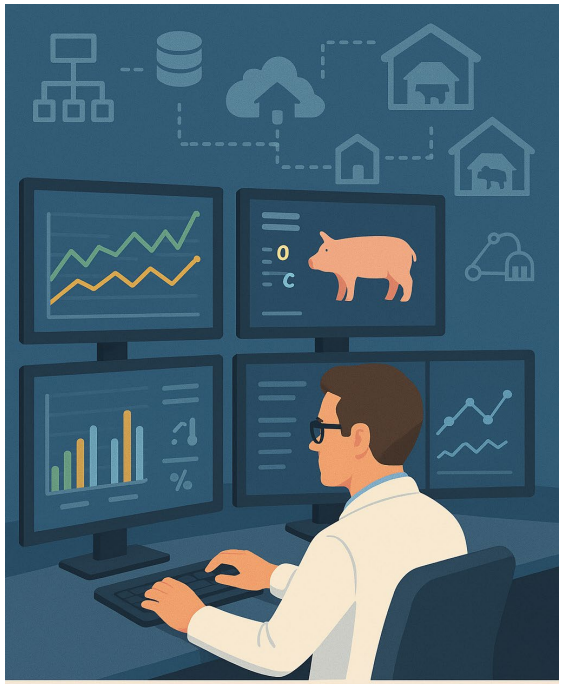


Master Table



- Reveal the major drivers of swine performance
- Causal effect of important selected factors
- Forecast productivity of recently weaned pig flows

PROSPER
Predictors of swine performance



PRECISION SWINE PRODUCTION

0.68 of the variation of the mortality was explained by pre-weaning factors

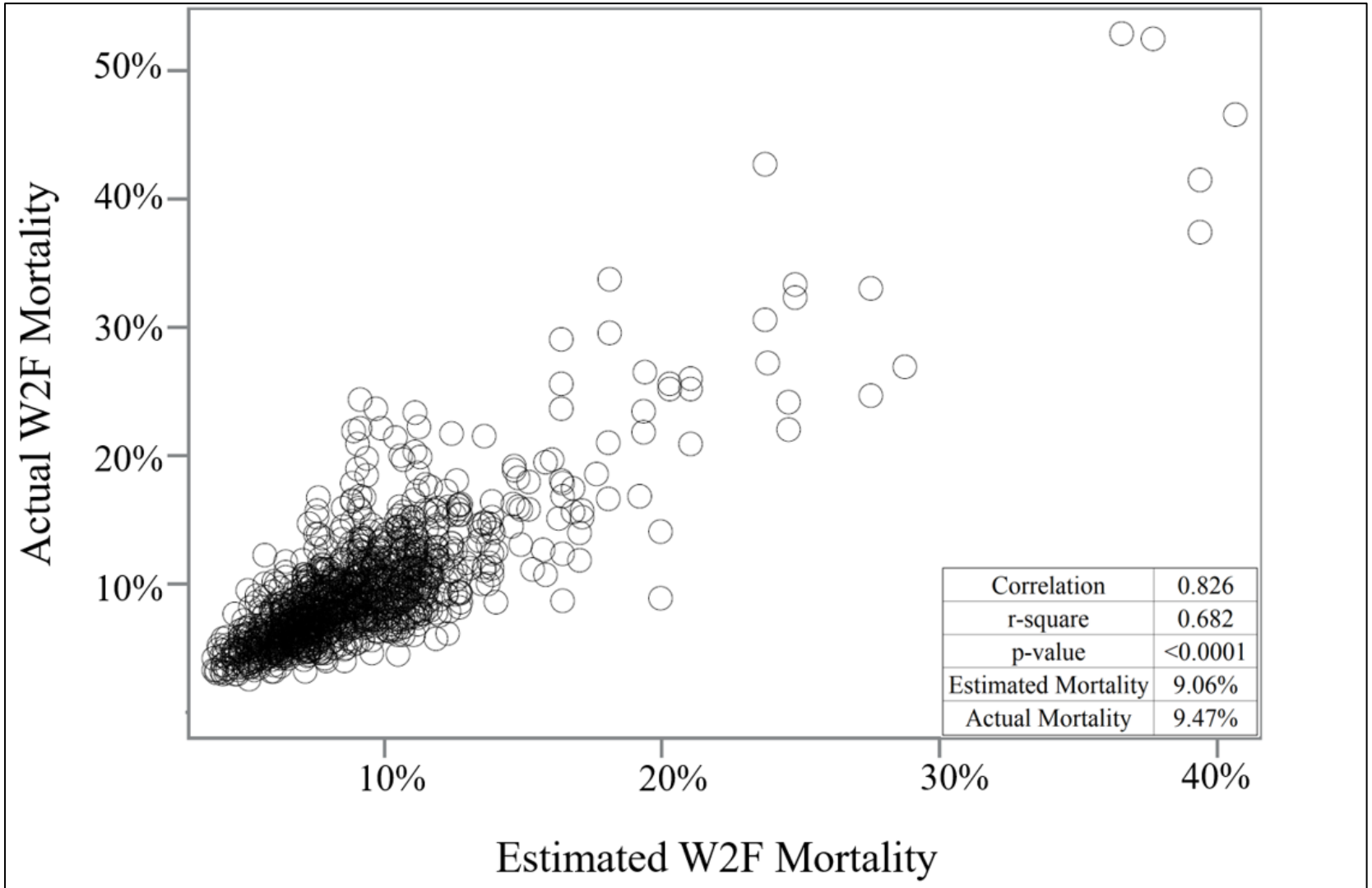
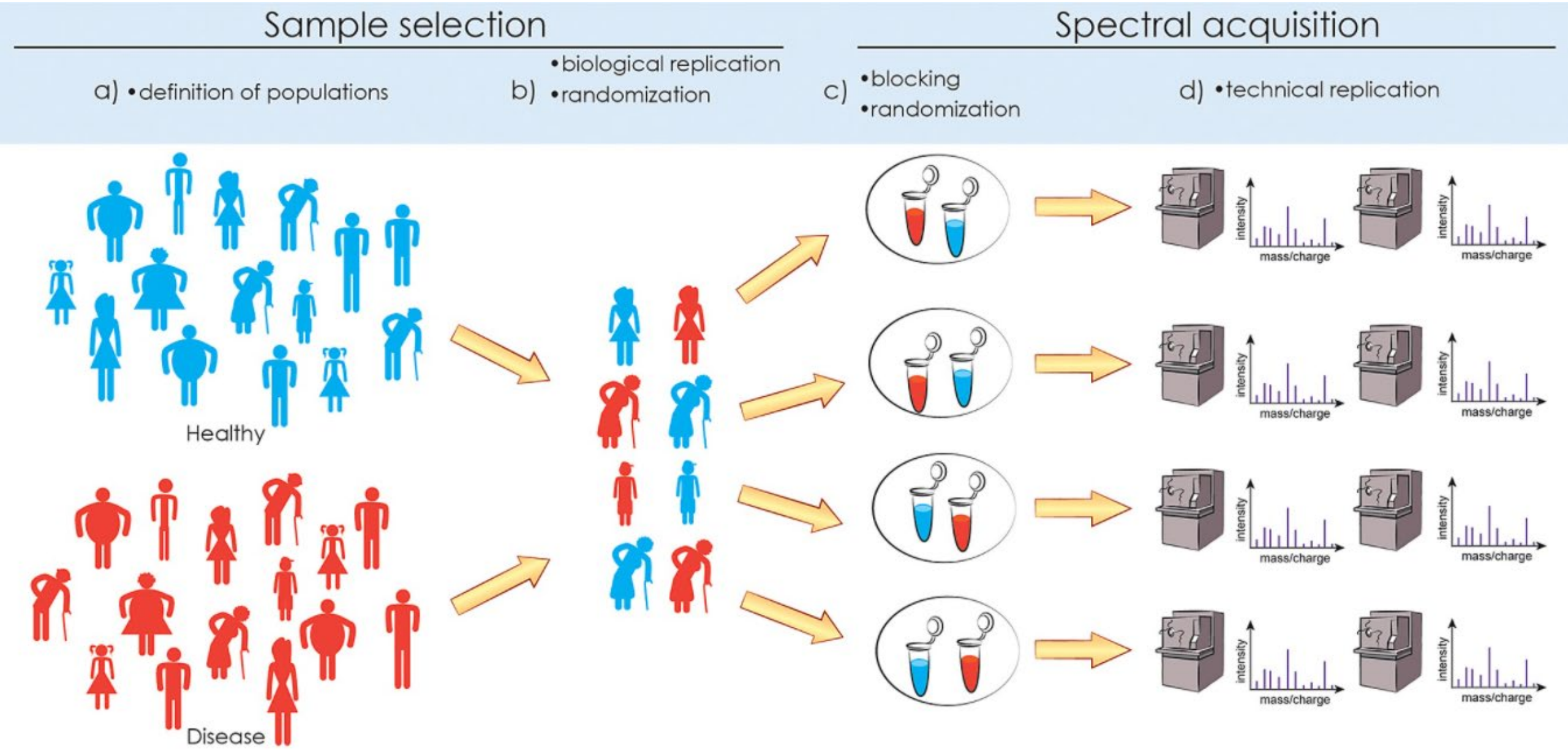


Fig. 3. Multivariable regression analysis of the 13 selected variables and 6 interaction terms listed in Table 8 on W2F mortality. Each open circle is one closeout.

Multivariable model

Pre-weaning mort.
Weaning age
Farrowing rate
Abortion rate
Service repeat rate
Parity at farrow
Gestation length
Birth loss
Total Born
Season
PRRSV status
Mhp status
Coronavirus break


Sample selection
a) •definition of populations
b) •biological replication
•randomization
Spectral acquisition
c) •blocking
•randomization
d) •technical replication
Healthy
Disease
intensity
mass/charge

E. coli **Impact on wean-to-finish mortality**

Table 1 – Comparison between nursery groups with or without an *E. coli* break.

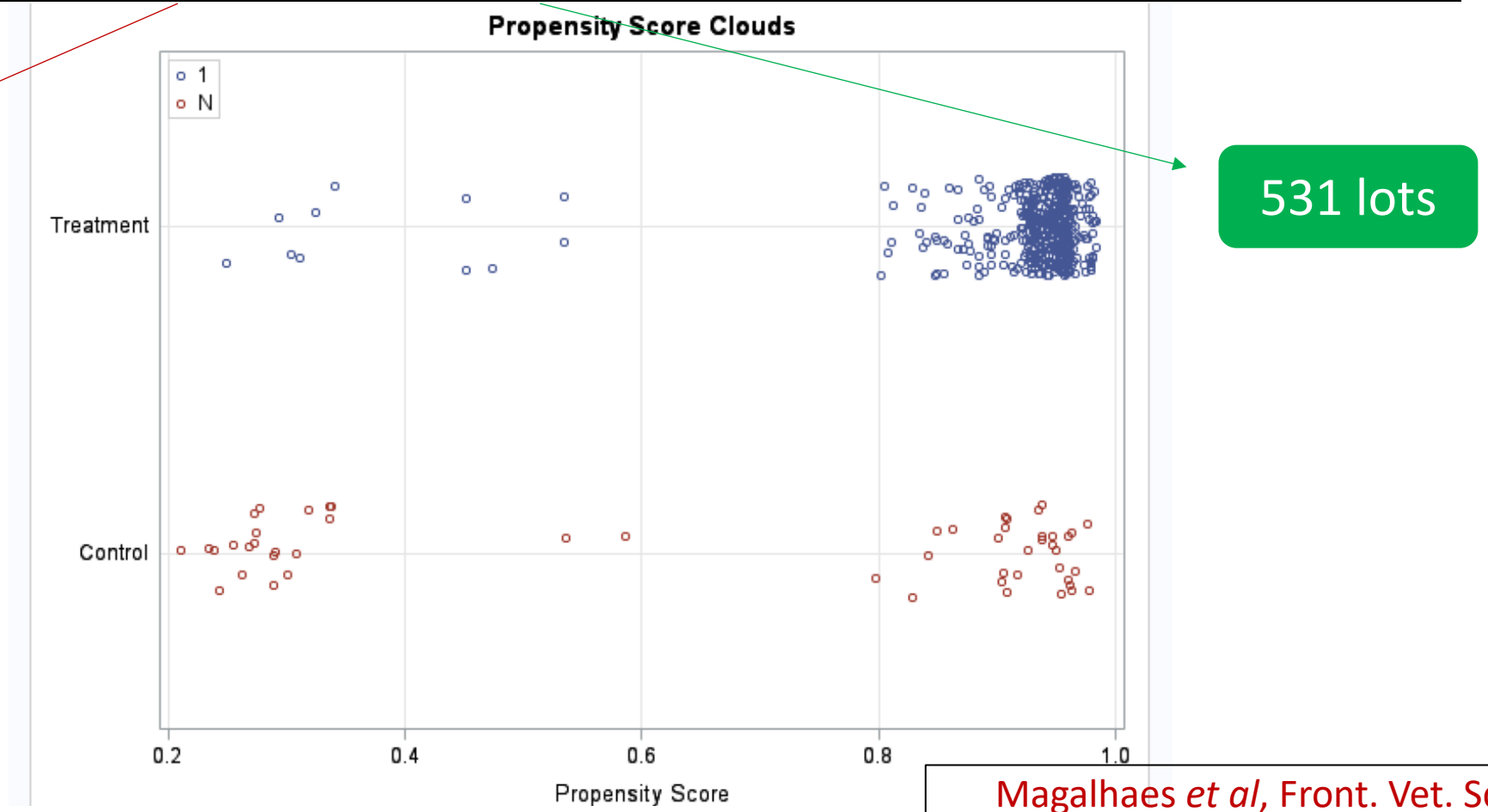
Outcomes	*E. coli* outbreak	No *E. coli* outbreak	Difference Δ	(p-value)
Nursery Mortality	5.36%[a]	3.09%[b]	2.27%	<0.0001

51 lots

531 lots

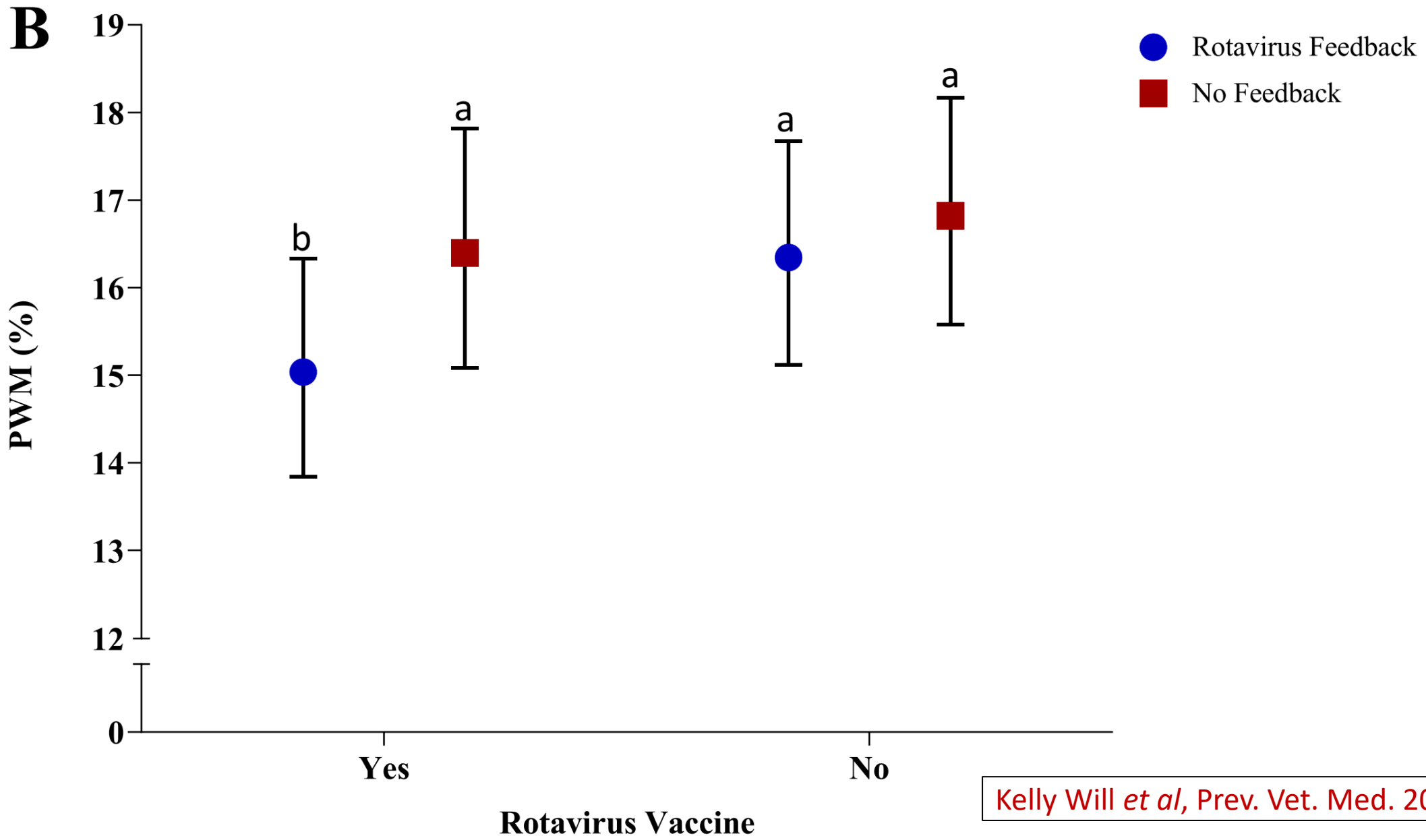
Controlling for:
PRRS status
PED status
Weaning Age
Stocking Density
Other Diseases

~3000 animals/lot



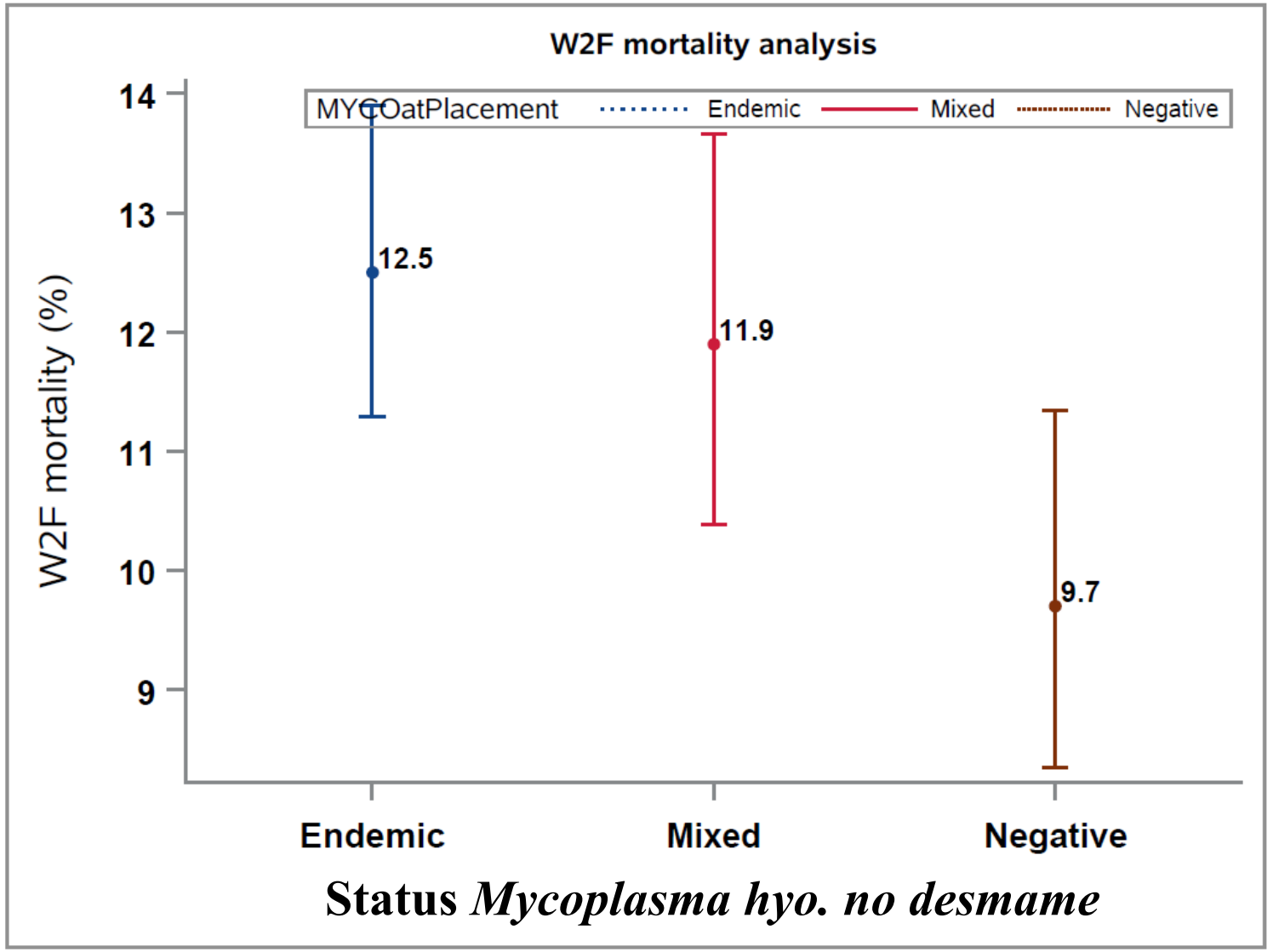
Magalhaes *et al*, Front. Vet. Sci. 2025.

Pre-weaning mortality & rotavirus interventions

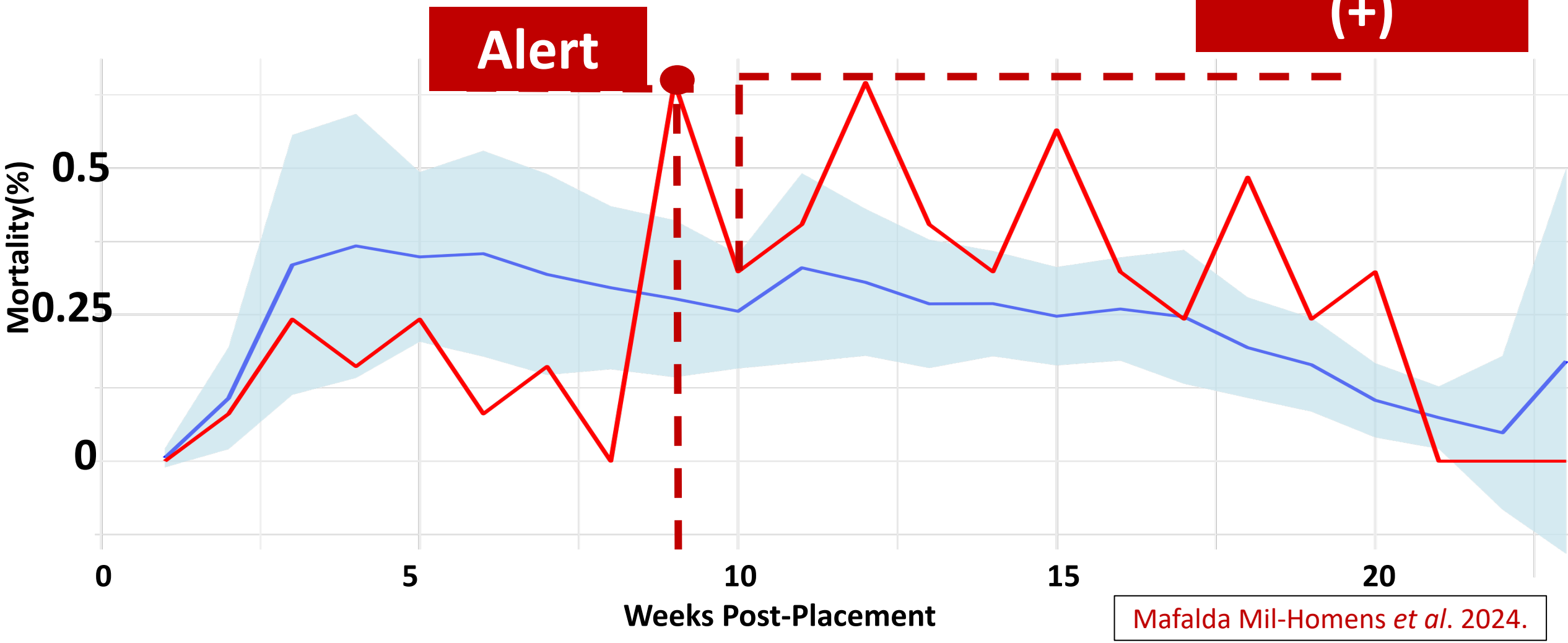


Kelly Will *et al*, Prev. Vet. Med. 2024.

Lower Mortality in (-) *Mycoplasma hyo.* flows



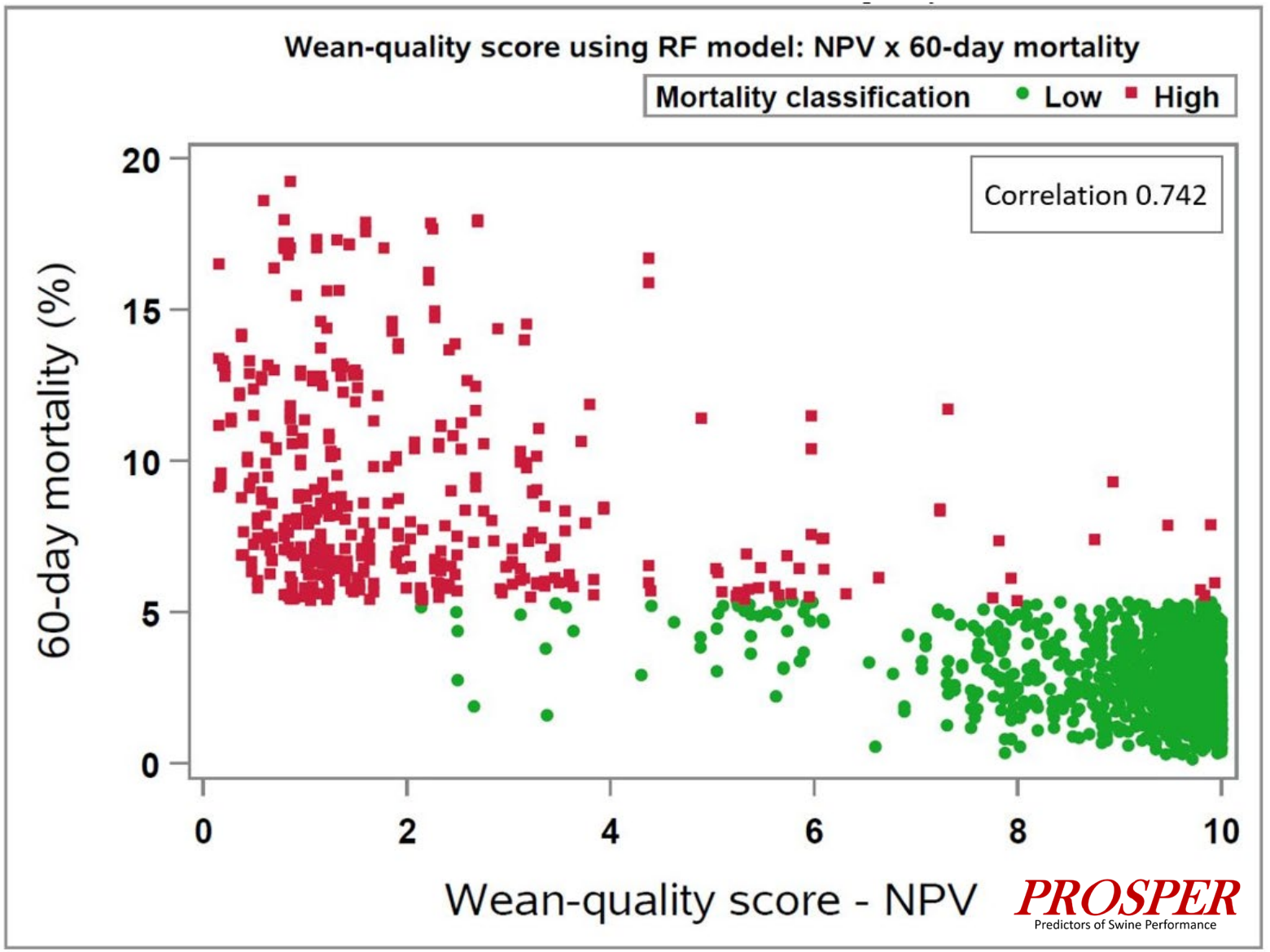
Monitoring growing lots



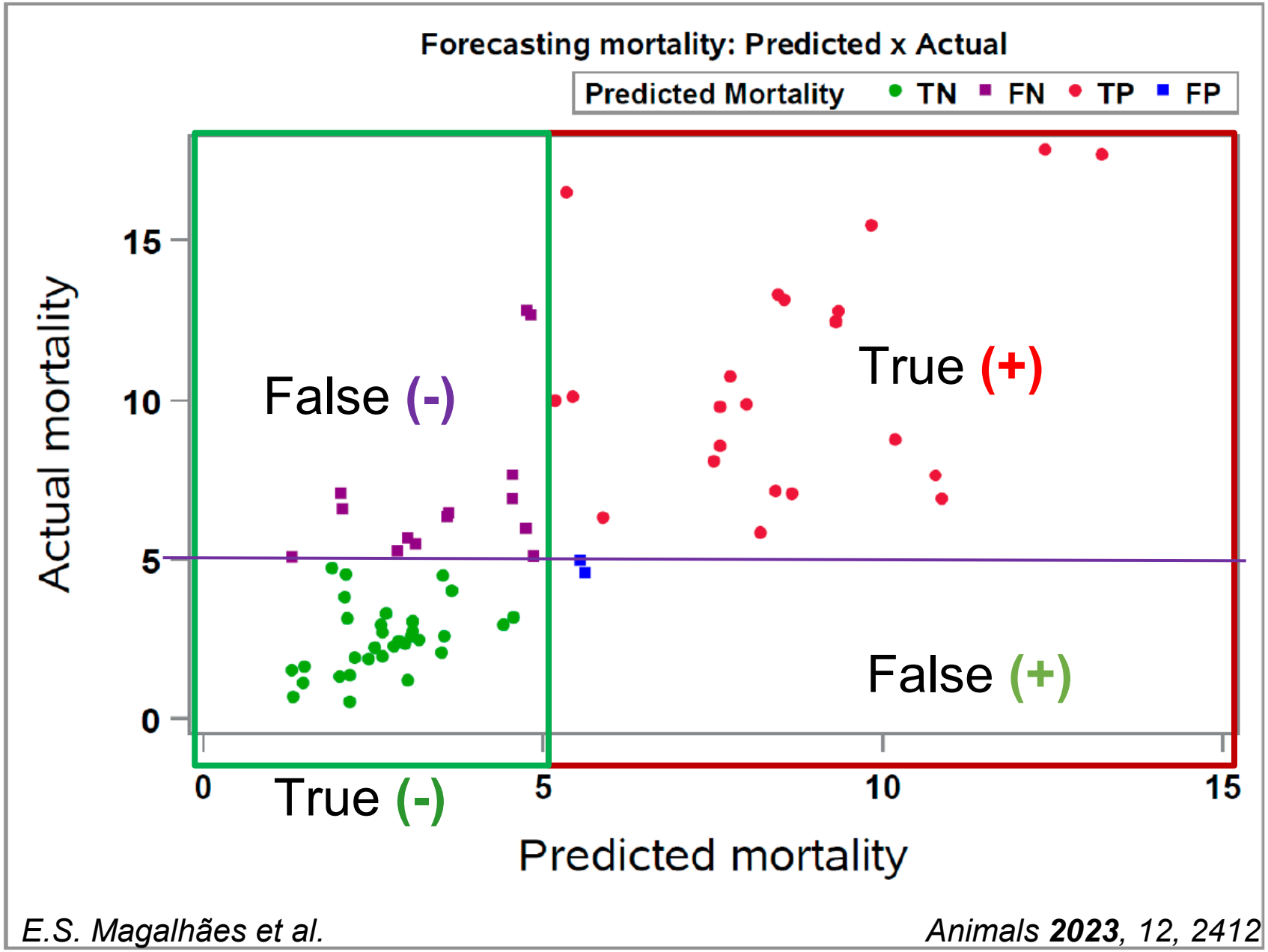
Mafalda Mil-Homens *et al*. 2024.

Creating a Wean-Quality-Score (WQS)

PWM
Weaning age
Avg. parity
Stocking density
Time to fill
Wean pig medication
PRRS status
Sow medication
M. Hyo status
Number of sources
Ventilation type



Magalhaes *et al*, Prev. Vet. Med 2024.



Forecasting performance

(R^2=0.554)

Accuracy: 77.78%

Sensitivity: 62.16%

Specificity: 94.29%

(+) Predicted value: 92.0%

(-) Predicted value: 70.2%

Field Data & Data-Driven Decision-Making

Strategic data-surveillance

Identification of at-risk groups through abnormal patterns of feed, water, temperature, medication, cough...

Prediction models with M.L

Mortality prediction, GPD, IEP, ideal date for slaughter, disease outbreaks...

Integrated data → actions

Strategic interventions based on deviations in piglet quality scores in each phase

Causal impact – Production & $

Calculation of the cost of mortality and/or diseases, vaccines, management, and medications ROI

SAVE THE DATE!

International Conference on Pig Livability

November 5 – 6, 2025

Hilton Omaha
Omaha, NE

https://piglivability.org/

Scan for more Information!

IMPROVING PIG LIVABILITY

K-STATE Research and Extension

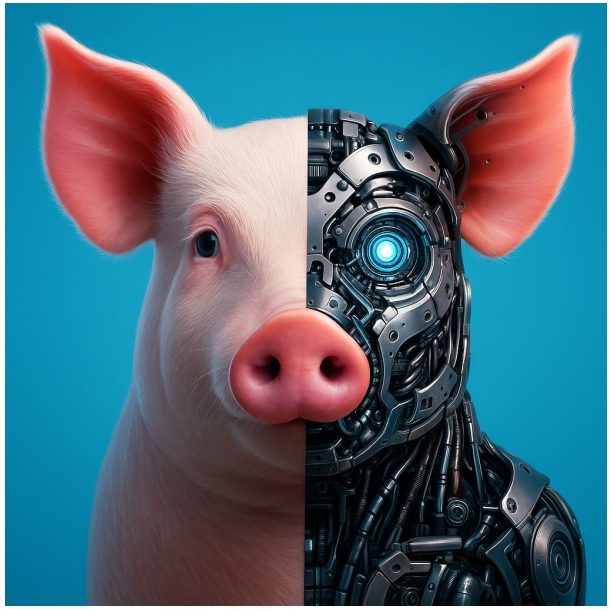
IOWA STATE UNIVERSITY

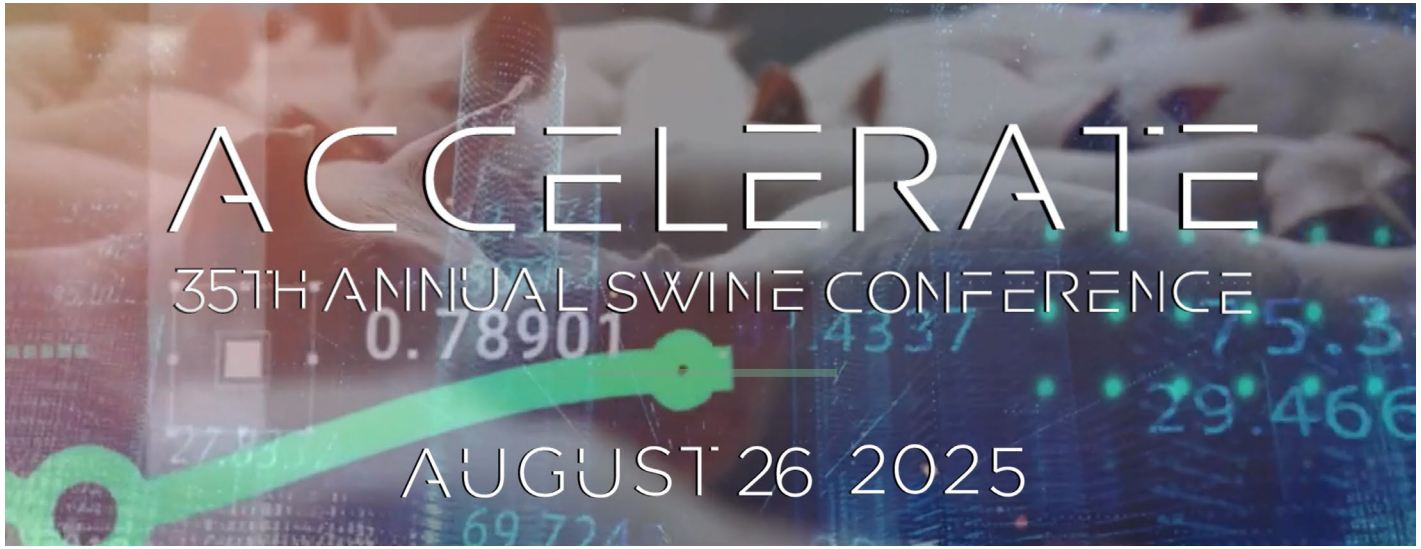
pork checkoff

FFAR

Thanks!

Edison Magalhaes, DVM, MS, PhD
Assistant Professor
edison@iastate.edu





PROSPER
Predictors of Swine Performance