

PRRS, Control or Eradication?

Clayton Johnson, DVM

Carthage Veterinary Service, LTD

Magapor[®]

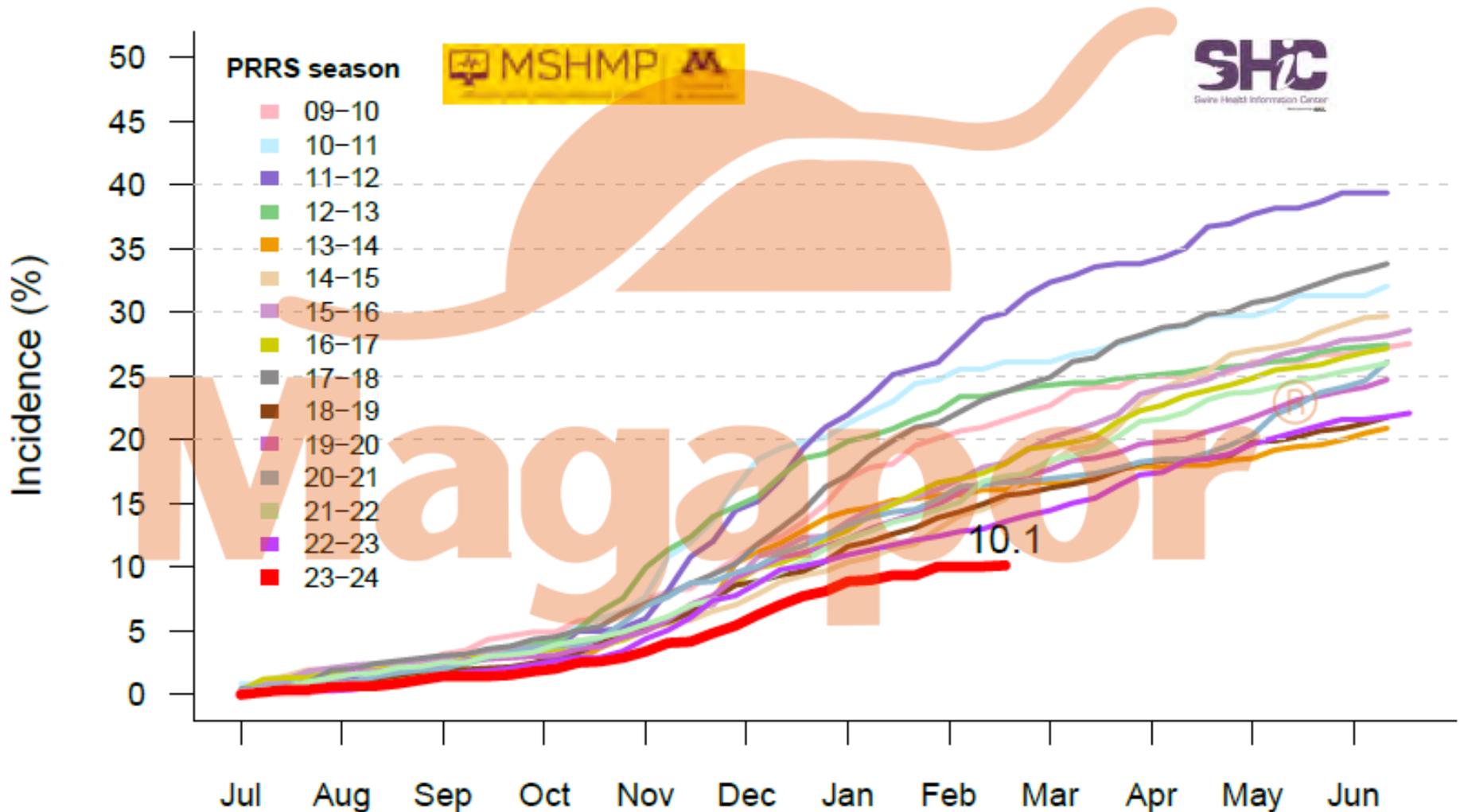
- Managing PRRS is
 - Complicated & Frustrating
- Systems That Don't Effectively Manage PRRS
 - Do Not Have Good Performance
- Effective PRRS Management Requires
 - Clear Definition & Goals
- PRRS Management Goals Should be
 - Flow Specific

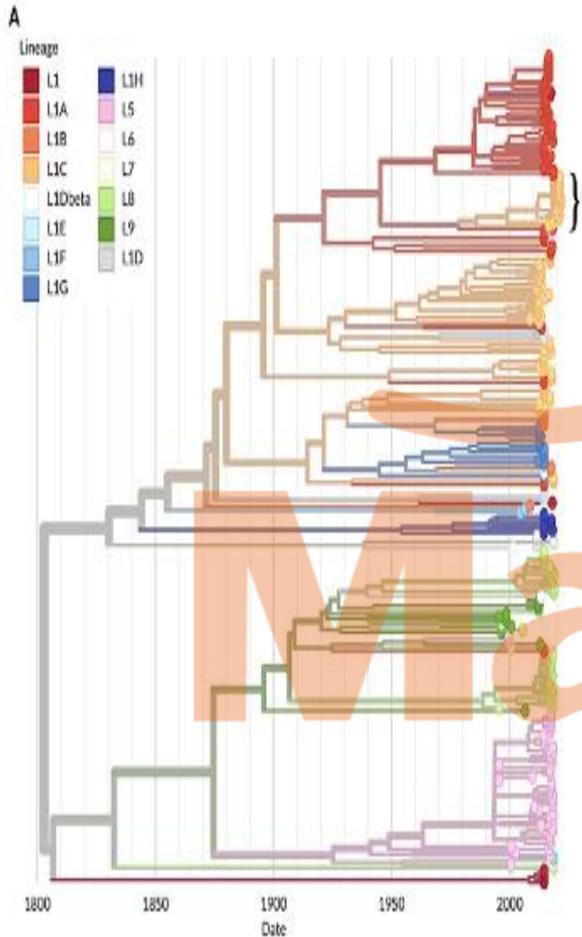
A stylized orange graphic of a Magapor character, showing its head and tail, positioned behind the title text.

PRRS Update – Current US Situation

Magapor[®]

Chart 1 – PRRS cumulative incidence beginning July 01, 2009





- PRRSv Replication Constantly Results in Antigenic Drift
 - Slightly Different Isolates are Always Created
 - Within Individual Pigs, PRRS Strains exist as a “Quasi-Species”
- PRRSv Recombination Facilitates Antigenic Shift
 - Significantly Different Isolates are Created
 - While not as Common as Antigenic Drift, it is just as Concerning
- Whole Genome Sequencing (WGS)
 - Allows Better Understanding of Virus Evolution over Time
 - Important for Sow Farm “Re-Break” Investigations
 - Important for New Strain Investigations

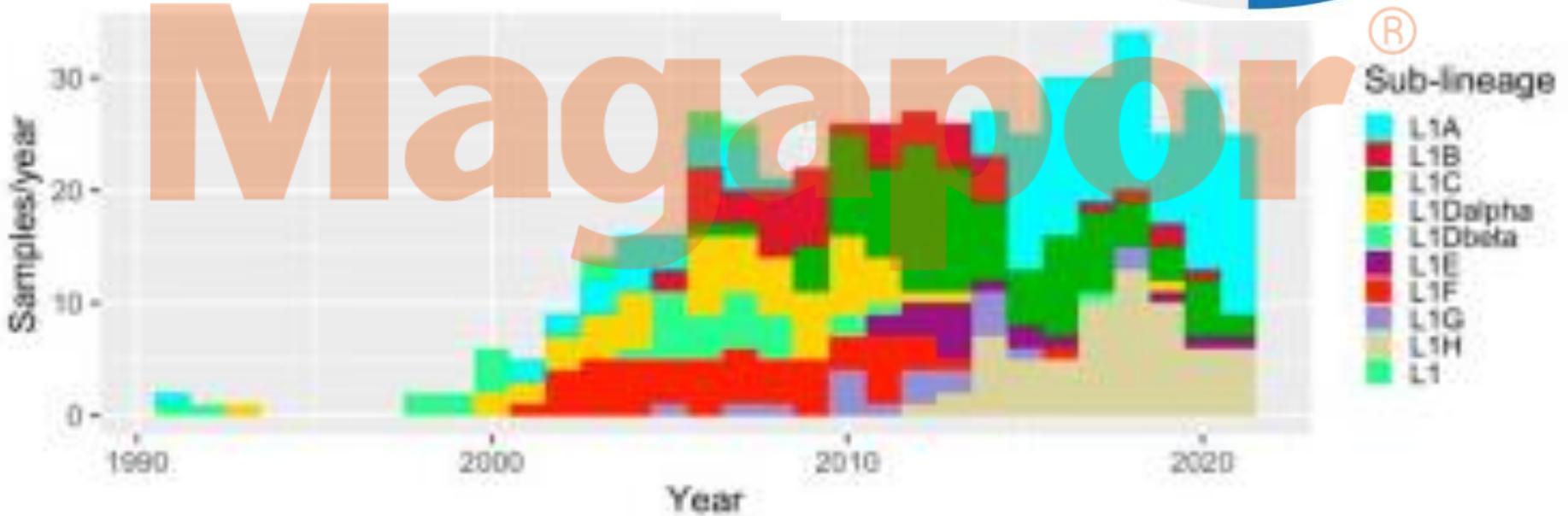
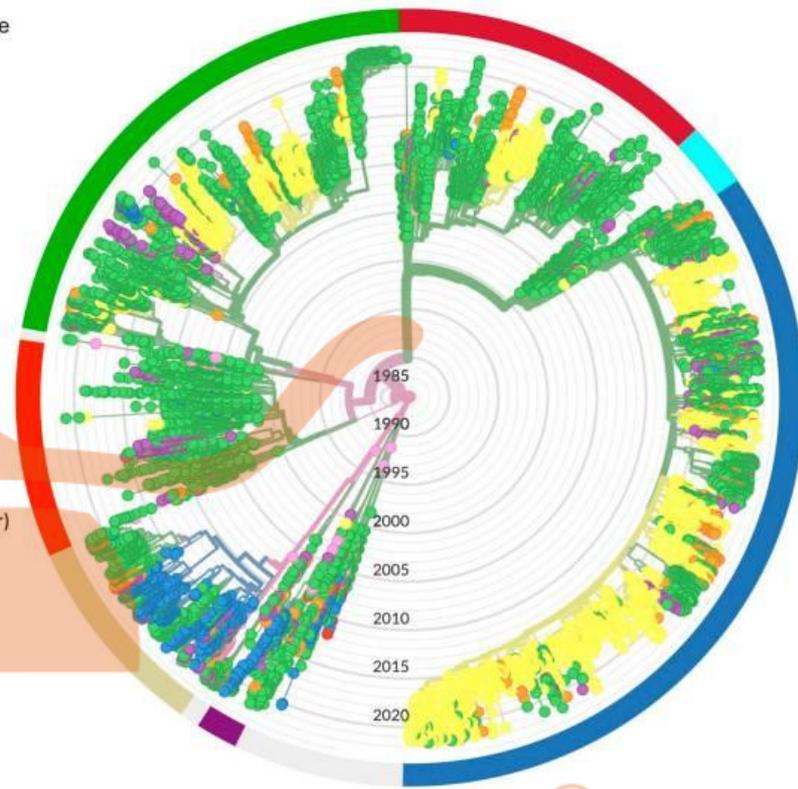
PRRS Strains Emerge & Are Displaced Regularly

Sub-lineage
(ring-color)

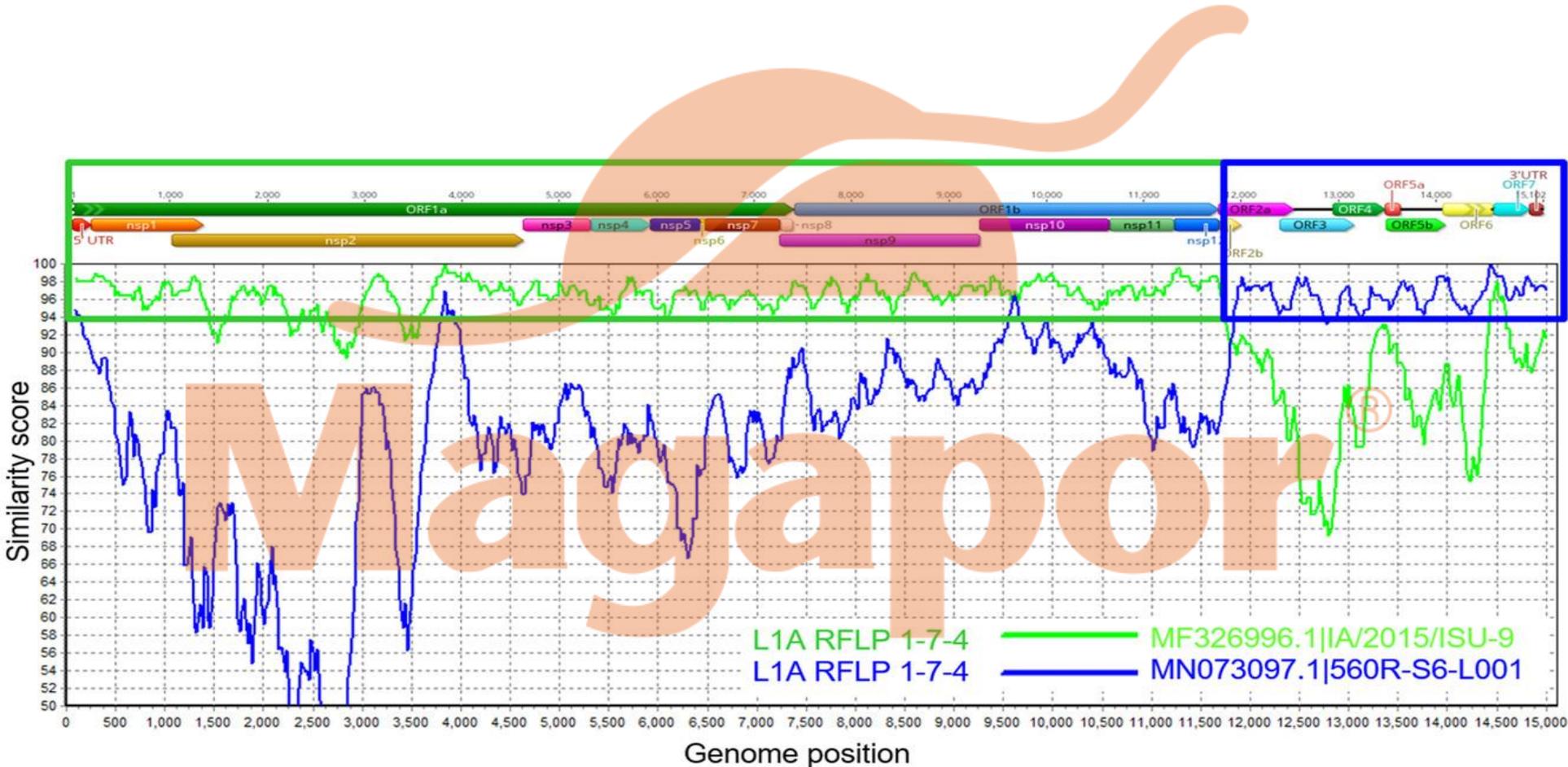
- L1A
- L1A(2)
- L1BG
- L1C
- L1E
- L1F
- L1H

Region
(branch/tip color)

- SW
- UMW
- CMW
- NE
- E
- CAD



Emerging PRRS Strains are Recombinants



- Producers Who Don't Eliminate WT PRRS Strains Create New Strains to Emerge
 - Resident WT PRRS Strain
 - New WT PRRS Strain
 - Co-Infection Within a Cell
- Most Recombination Events aren't Recognized
 - Resulting Virus not a Better Fit for Environment
 - Those that are a Better Fit for the Environment Emerge and Replace their Ancestors

- Patterns are Predictable
 - Novel Emergent Viruses Every 2-4 Years
 - Cycle Time Roughly Coincides w/ Sow Lifetime
 - Presumed that “Herd Immunity” Plays a Role in Stopping the Emerging Strain Spread
 - Presumed that Immunity Gaps are Exploited by Most Subsequent Recombinant Emerging Strains
- Regions are Predictable
 - While Most Producers Eliminate WT PRRS from Breeding Herds, there are Several Pig Producing Regions that Don't
 - Maintain Serum Exposure
 - Do Not Close PRRS Infected Herds
 - Their Goal is “PRRS Stable” – No Clinical Signs in Breeder Herd



PRRS Management

Magapor[®]

PRRS Stage	PCR Status	Antibody Status	Breeders Clinical?	Fatteners Clinical?
1A	Positive (High Prev)	Positive	Yes	Yes
1B	Positive (Low Prev)	Positive	No	Yes
2	Negative	Positive	No	No
2-MLV	Positive (MLV)	Positive (MLV)	No	No
3	Negative	Positive & Negative	No	No
4	Negative	Negative	No	No

Magapor[®]

COMMENTARY **PEER REVIEWED**

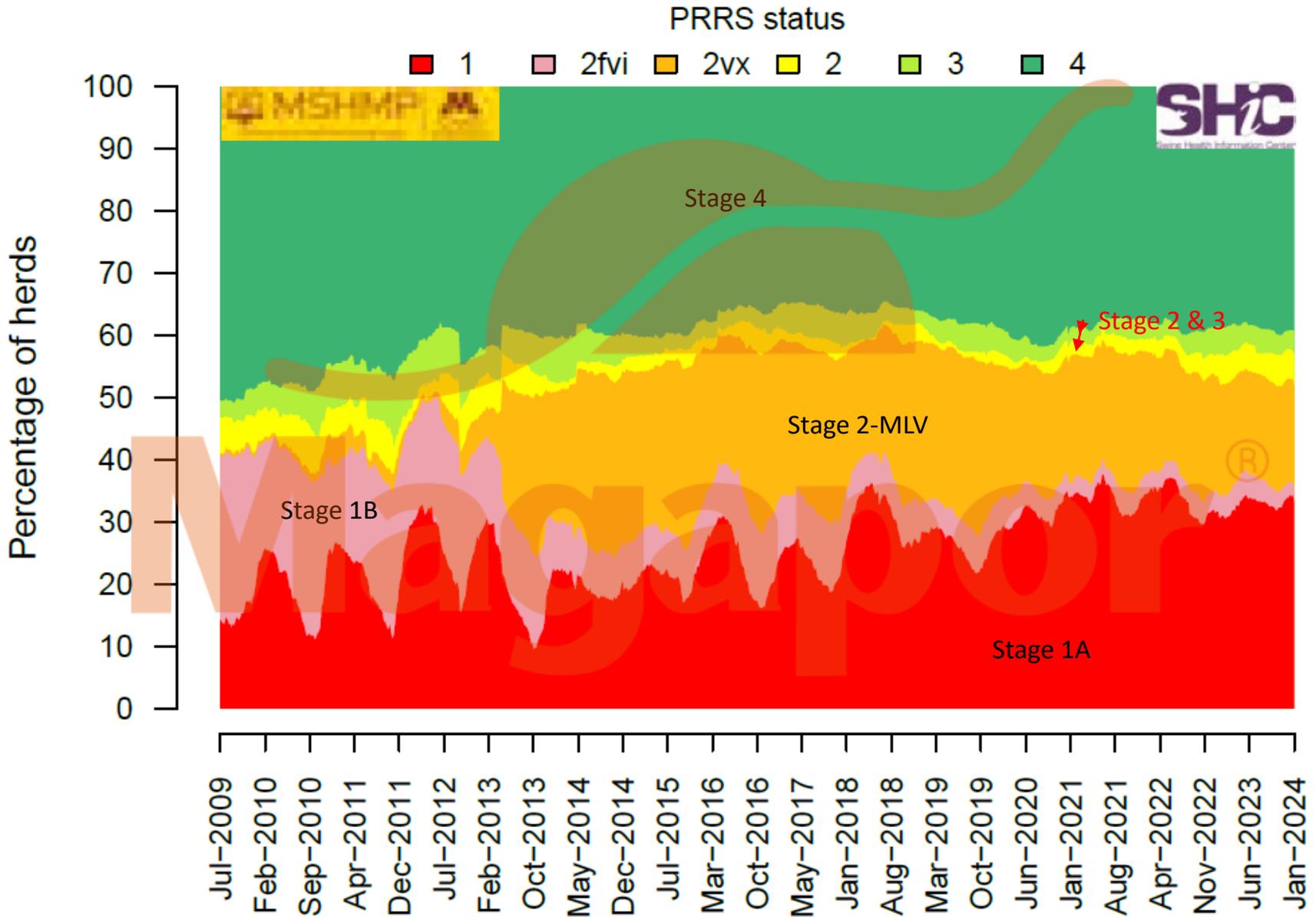
Terminology for classifying swine herds by porcine reproductive and respiratory syndrome virus status

Derald J. Holtkamp, DVM, MS; Dale D. Polson, DVM, PhD; Montserrat Torremorell, DVM, PhD; and committee members
Bob Morrison, DVM, PhD, MBA (chair); Dyneah M. Classen, DVM; Lisa Becton, DVM; Steve Henry, DVM; Max T. Rodibaugh, DVM;
Raymond R. Rowland, PhD; Harry Snelson, DVM; Barb Straw, DVM, PhD; Paul Yeske, DVM, MS; Jeff Zimmerman, DVM, PhD

- Stage 4 (PCR Neg/Antibody Neg)
 - No PRRS Impact, Greatest Genetic Potential
 - No Antibody Protection (Breeders), Future Outbreaks Severe
- Stage 2 MLV (PCR MLV/Antibody Pos)
 - Minimal PRRS Impact, No Good Evidence of Decreased Genetic Potential
 - Antibody Protection for Breeders & Fatteners, Future Outbreak Protection
 - **Requires Wild Type PRRS Elimination from Breeder Herds[®]**
- Stage 1B (PCR Pos/Antibody Pos)
 - Minimal PRRS Impact at Breeders, Significant Impact in Fatteners
 - No WT PRRS Elimination Required, but Constant Gilt Acclimation Required
 - Allows for Continuous Gilt Introductions – Easiest for Breeders

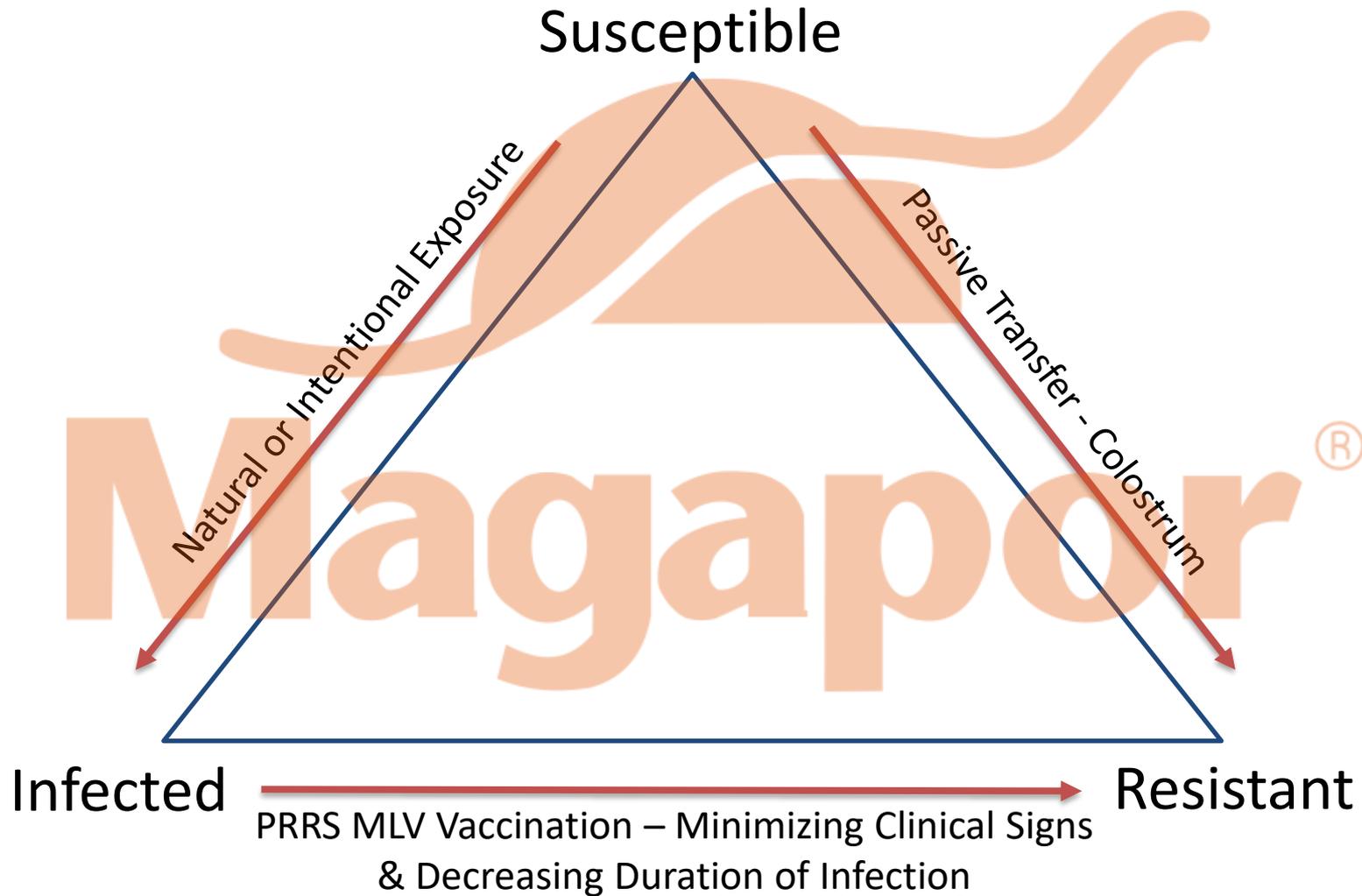
What's the Right Answer? Perspective:

Chart 2 – PRRS prevalence of sow herd status beginning July 01, 2009



I Have Wild Type PRRS in Breeder Farm, What are My Options?

- Option 1: Do Nothing
 - Farm Will Stabilize Somewhat – Low Prevalence
 - Eventually Stage 1B
 - **Easiest, Worst Performance**
- Option 2: Herd Closure of Breeder Herd
 - Load/Close/Homogenize (LCH)
 - 40-50 Weeks, +/- Off Site Breeding Project
 - **Hardest, Best Economic Outcome for Mild/Moderate Strain**
- Option 3: Depopulate/Repopulate
 - Capital Investment Analysis, +/- Off Site Breeding Project
 - Fastest Return to Target Performance
 - **Economic Outcome Varies, Best for Severe Strain in Profitable Pig Markets, Duration of Good Performance Critical**



- Financial Analysis is Critical
 - Payback period
 - Time before complete recovery of investment
 - Does not account for time value of money
 - Net present value (NPV)
 - Does account for time value of money – all cash flow to present value
 - Must have Cash flow, discount rate and time frame defined
 - Internal rate of return (IRR)
 - Sets $NPV = 0$, Does account for time value of money
 - Can compare Investments of Different Size
 - Compares IRR to Cost of Capital, when $IRR > \text{Cost of Capital}$, Owner Equity is Increased

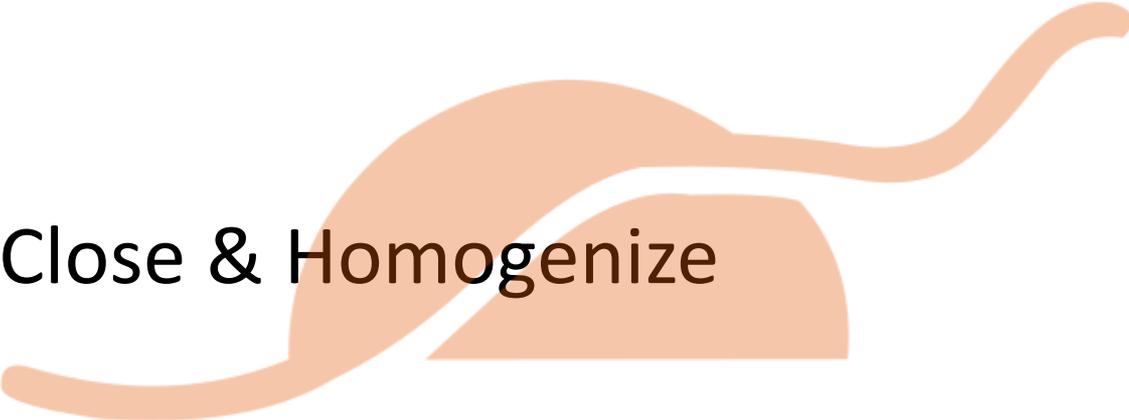
- Timing of:
 - Last Female Mated
 - Sow Culling
 - Replacement Gilt Purchase
 - Breeding Project (On Site vs Off Site)
 - Resumption of Farrowing

- Cost/Revenue Impact of:
 - Feed Cost Savings
 - Cull Revenue
 - Gilt Purchase Cost
 - Off Site Breeding Project Cost
 - Site Cleaning/Disinfection
 - Labor Cost Adjustments

Magapor®

- Higher Costs to Consider – LCH
 - Lost Productivity – Breeding Poor Quality Animals
 - Lost Productivity – Parity Impact
 - Diagnostic Cost
 - MCREBEL Cost (Mortality)
 - MCREBEL Cost (Supplies)
 - Lost Revenue (Wean or Feeder Pig PRRS Penalties)
- Benefits to Consider – Depop/Repop
 - Improved Productivity – Genetic Improvement

- Load, Close & Homogenize



Magapor[®]

- Load, Close & Homogenize
 - Load: Enter as Many Gilts as Possible

Magapor®

- Load, Close & Homogenize
 - Load: Enter as Many Gilts as Possible
 - Close: Do Not Enter New Gilts During Herd Closure

Magapor®

- Load, Close & Homogenize
 - Load: Enter as Many Gilts as Possible
 - Close: Do Not Enter New Gilts During Herd Closure
 - Homogenize: Mass Vaccination with PRRS MLV Vaccine Twice, 30 Days Apart, Boosters Quarterly

Homogenization Using LVI or MLV

	LVI	MLV
# Gilts	1000	1000
Mortality	6.8%	1.8%
ADG	1.38	1.52
FE	3.02	2.90
Selection Rate	65%	79%
HNS% 28 wks	68%	90% [®]
HNS% 35 wks	85%	98%
Number Bred	519	768
Farrowing Rate	86%	90%
Total Born	13.5	14.0

- Wash Hallways After Movement
- Farrowing Crate Integrity
- CO2 Piglet Euthanasia
- Contain Testicles & Tails
- Avoid Stepping in Crates
- Hot Box Liners
- Wash Dead Disposal Area
- Avoid Holding Room Use
- Sow/Gilt Feedback
- Change Needles/Blades
- Change Gloves/Sleeves
- Contain Contaminated Supplies
- Cross Fostering
- Fallback Management
- Rolling Back Litters[®]
- Post-Weaning Hygiene
- Processing Hygiene
- No Processing Cart

How Do We Know the Breeder
Herd has Eliminated Wild Type
PRRS?

Magapor[®]



Litter oral fluids
= poor reproducibility



Dr. Marcelo Almeida

Family oral fluids
= success rate ~ 95%



- Start with Processing Fluids:
 - 1 PCR/week: Pooled Sample, All Pigs Processed
 - Continue until Negative for 2 Consecutive Weeks
 - Transition to 1 Processing Fluid PCR with all Pigs Processed per Room
 - Continue until Negative for 8 Consecutive Weeks
- Confirm Due to Wean Pig Status:
 - Minimum 20 Litters per Week
 - 1 PCR/Litter
- Open Herd to Gilt Introductions When:
 - 8 Weeks Processing Fluid Negative AND
 - 4 Weeks Weaned Pigs Negative (12 Total Weeks Negative)



PRRS Outbreak Management
Project (POMP)

Magapor[®]

Core program

Actions following PRRS outbreak

POMP database

Outcomes and Deliverables

PRRS
Outbreak

10 min survey: update once/quarter →
Herd demographics, PRRSv, immunologic solutions sows/gilts, gilt flow, timing of bio-management strategies

AHMES: link herd to POMP →
Ongoing automated diagnostic data pushed to POMP (PCR, ELISA for PRRS)

Effect of key survey factors & patterns of diagnostic results on the success rate and/or time to:

- Low prevalence
- Stability
- Prov. negative
- Naïve

Extra mile 1:
Productivity

One time, share performance monitor →
Weekly abortions, PNL, PWM, pigs weaned

Key survey factors & diagnostic patterns on TTBP, production loss: total throughput (#weaned/wk), and specific parameters (aborts, PWM, etc)

Extra mile 2:
Genomics

Whole-genome sequencing →
Viral diversity, # strains, rate of change

Effect of viral diversity, # strains, and rate of change on the success rate and TTS and TTBP-related metrics.



Deliverables: Quarterly industry summary report, monthly benchmarking reports & online dashboards

❑ TTS: time to stability

- TTS is defined as the farm achieving PRRSV low-prevalence (AASV)
- Processing fluids/Serum/Oral fluids/Tongue tips

❑ TTBP: time to baseline production

- TTBP is the number of weeks after the outbreak to recover the productivity in weaned piglets that the farm had before the outbreak

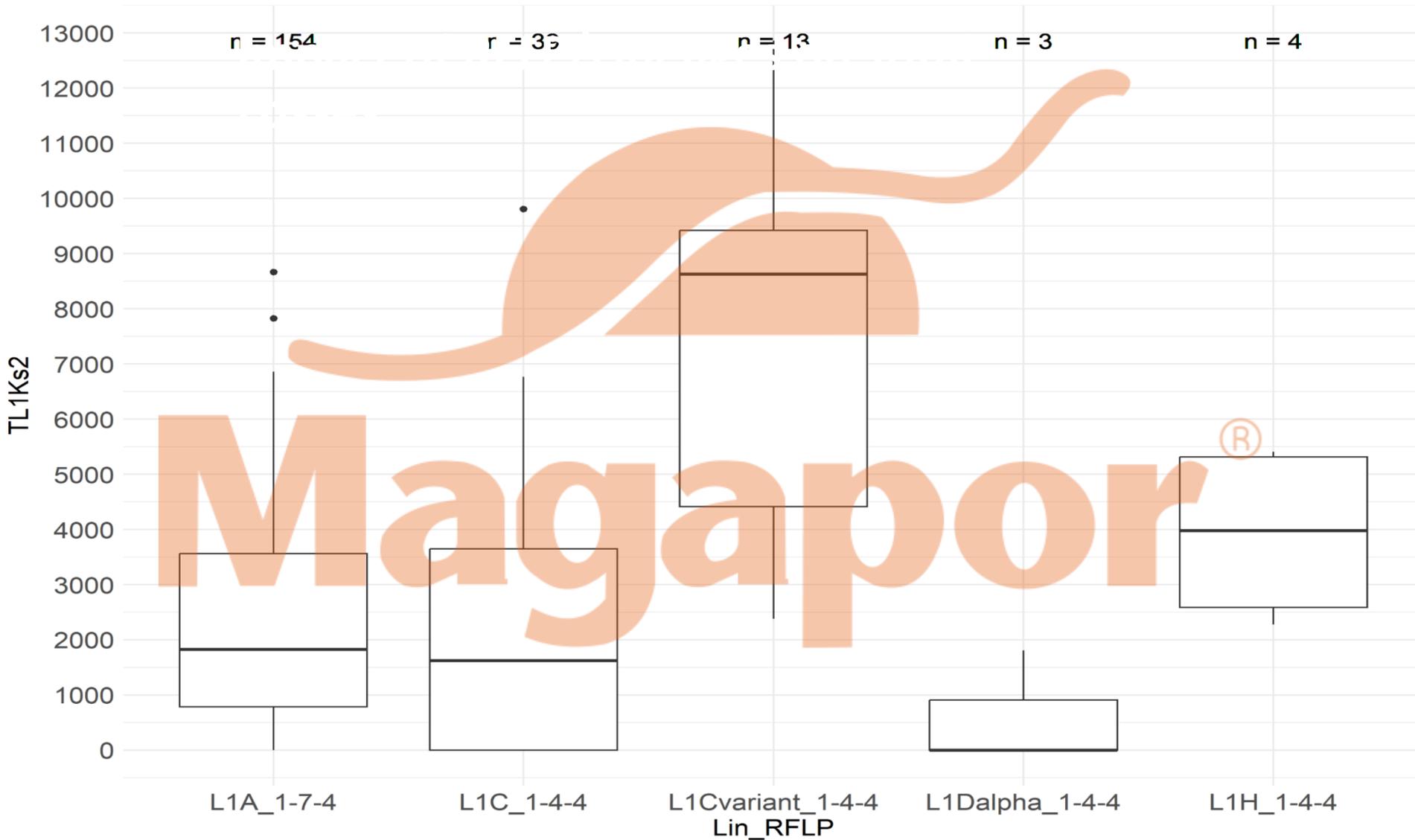
❑ TL: total loss (# pigs not weaned / 1,000 sows)

- TL is the total of piglets that did not wean after the outbreak based on the number of weeks of TTBP divided by 1,000 sows

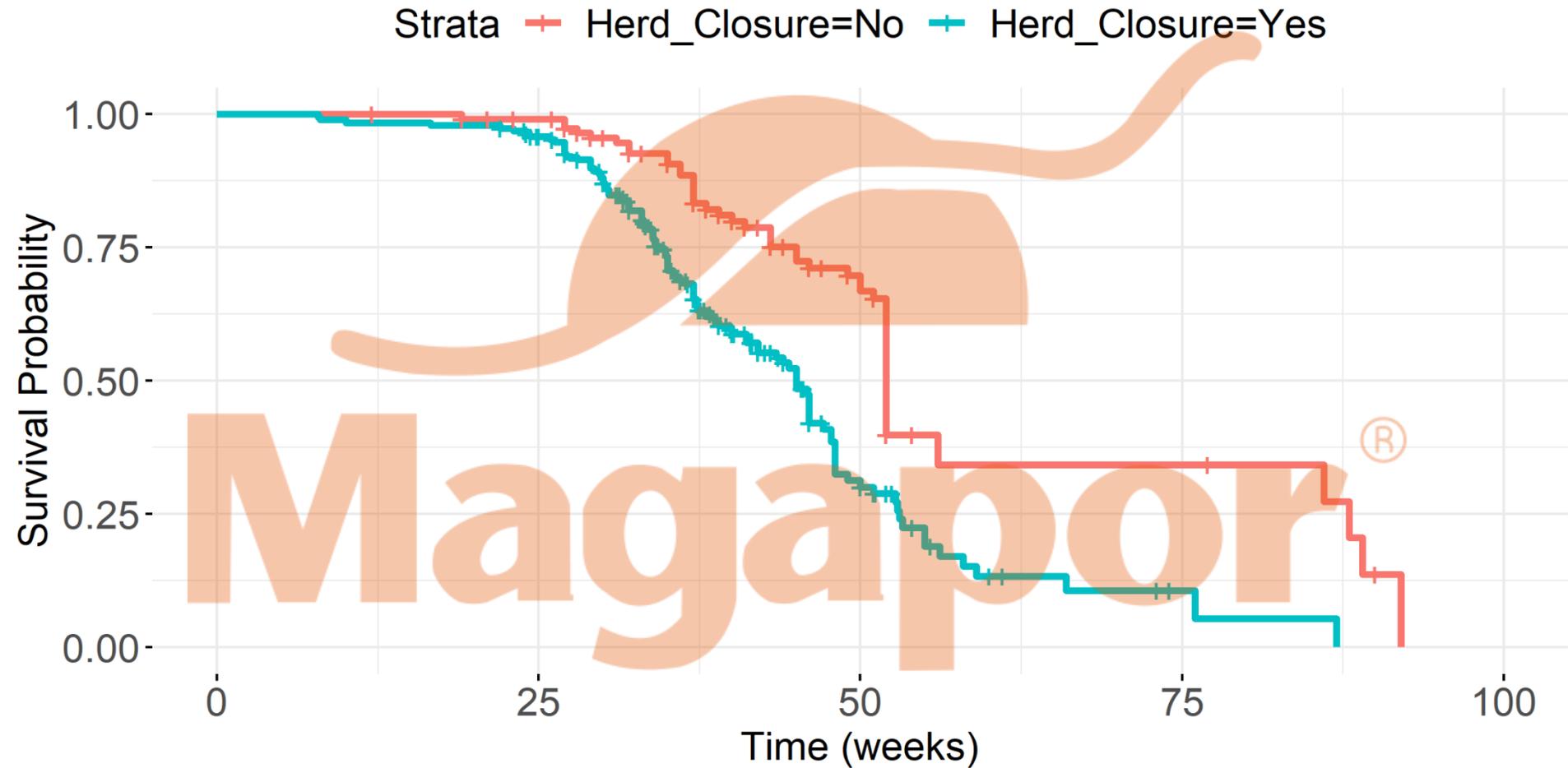
Magapor®

- 411 farm outbreaks for TTS, TTBP, TL covering 2010-2023
- 67 completed farms with full survey information (2018-2021)
- 32 farms currently enrolled awaiting stabilization[®]
- Some preliminary data analysis

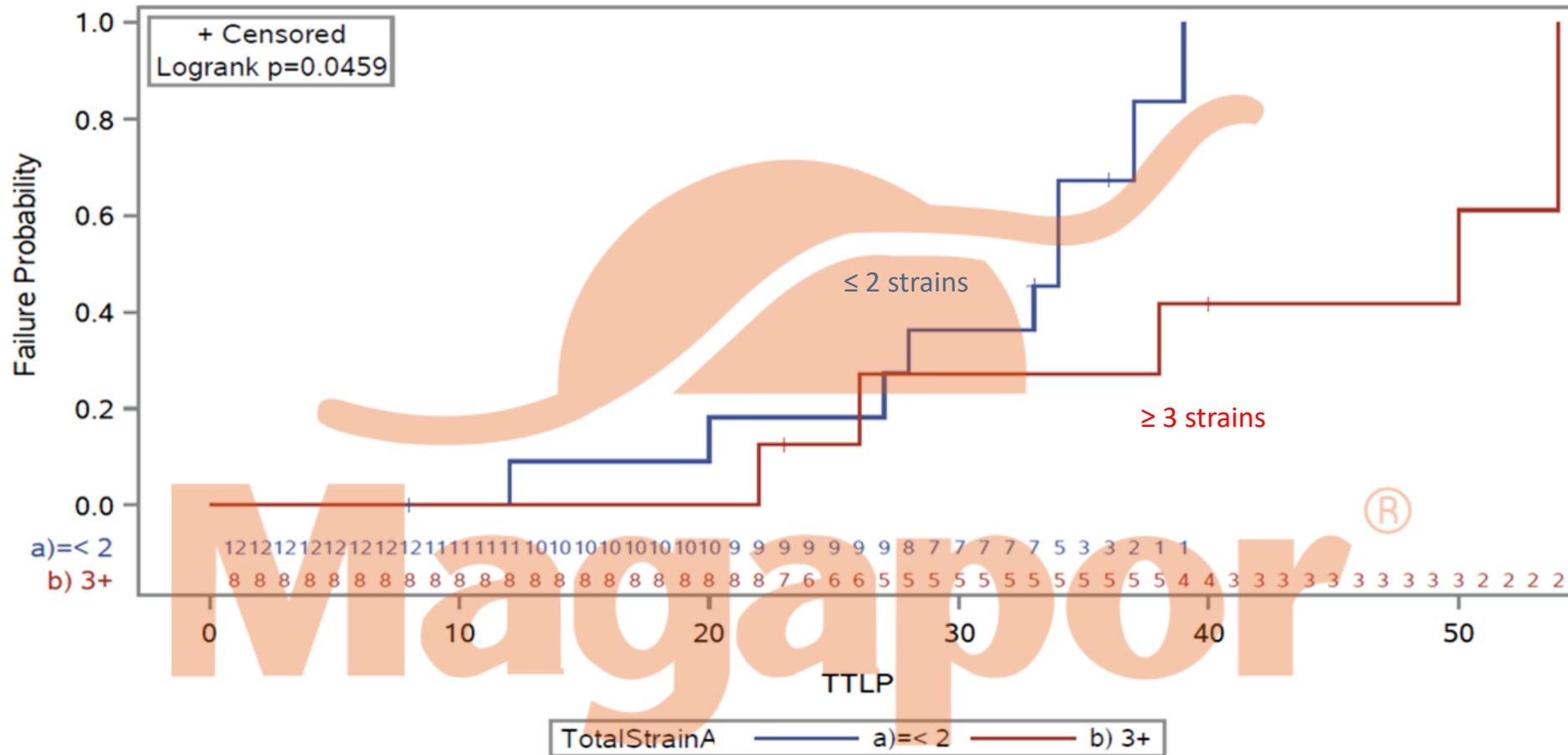
Lineage is Helpful for Prognosis



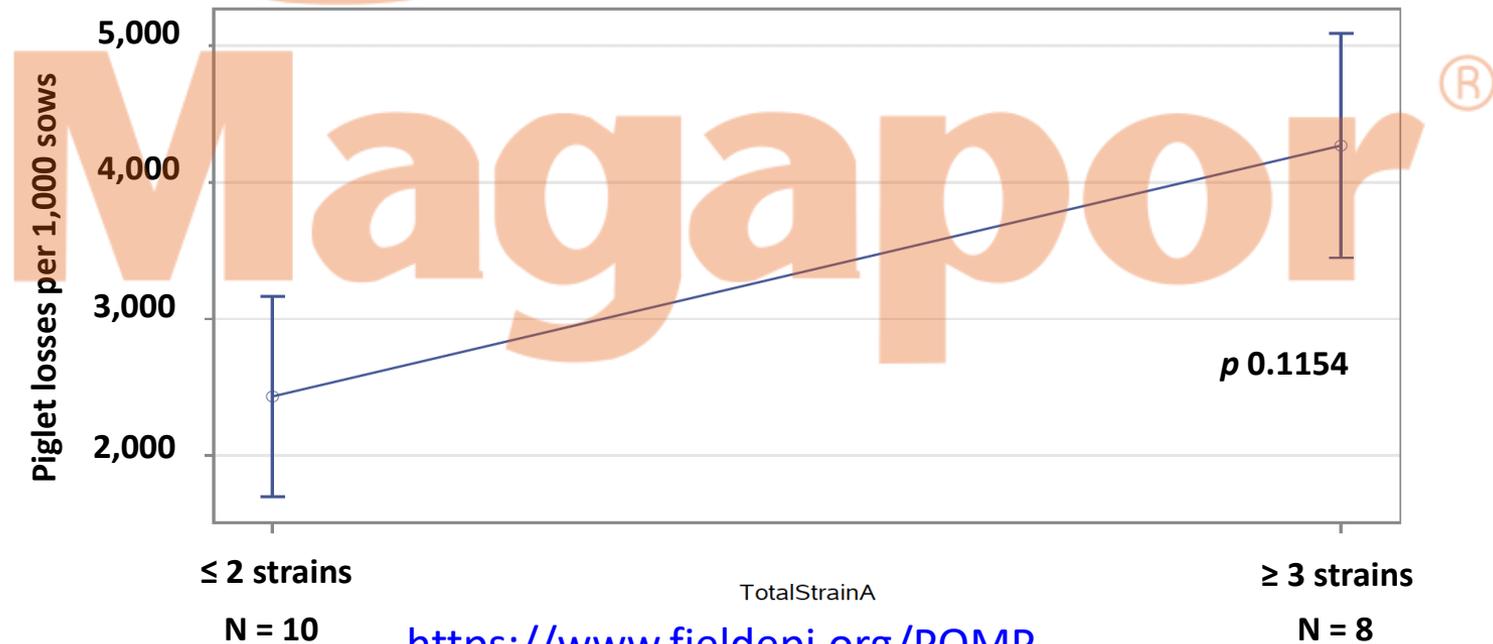
TTS achieved faster in sites that closed the herd



Farms with ≥ 3 strains reached low prevalence 12 weeks after farms with ≤ 2 PRRSV strains



Farms with ≤ 2 PRRSV strains detected had 1,837 fewer piglet losses/1,000 sows than farms with ≥ 3 PRRSV strains



Farms with recombination events detected had **1,827 higher piglet losses / 1,000 sows** than farms with no recombination events detected



- PRRS Management is both Difficult and Necessary to be Successful
- Consider Customized PRRS Management Strategies in Every Pig Flow
- “PRRS Stable” (Stage 1B) = PRRS Impact in Site 2 & 3
- PRRS Impact is Dramatically Worse with >2 Strains (Multiple Wildtype Strains)
- Depopulation & Repopulation is Becoming More Common in US
- Veterinarians who Can Create Economic Models are Highly Valuable
- We Learn Best when we Learn Together – Consider POMP Participation



THANKS
GRACIAS

Magapor[®]

MAGAPOR 16ITM - APR 24 & 25 2024 – ZARAGOZA - SPAIN