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Global PRRS situation: eradication is possible

CARLES VILALTA

Magapor®

ITM Magapor 17 **MAY 2025** - ZARAGOZA

OUTLINE

- INTRODUCTION
- CONTROL/ERADICATION OF PRRSV AT COUNTRY LEVEL
  - CHILE
  - HUNGARY
  - DENMARK
  - UNITED STATES
- PRRSV ELIMINATION CONSIDERATIONS
- FINAL REMARKS

INTRODUCTION

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GOAL

To review information regarding PRRSV eradication or control initiatives at national level to learn what has been working.

To review useful tips regarding PRRSV eradication at the farm level.

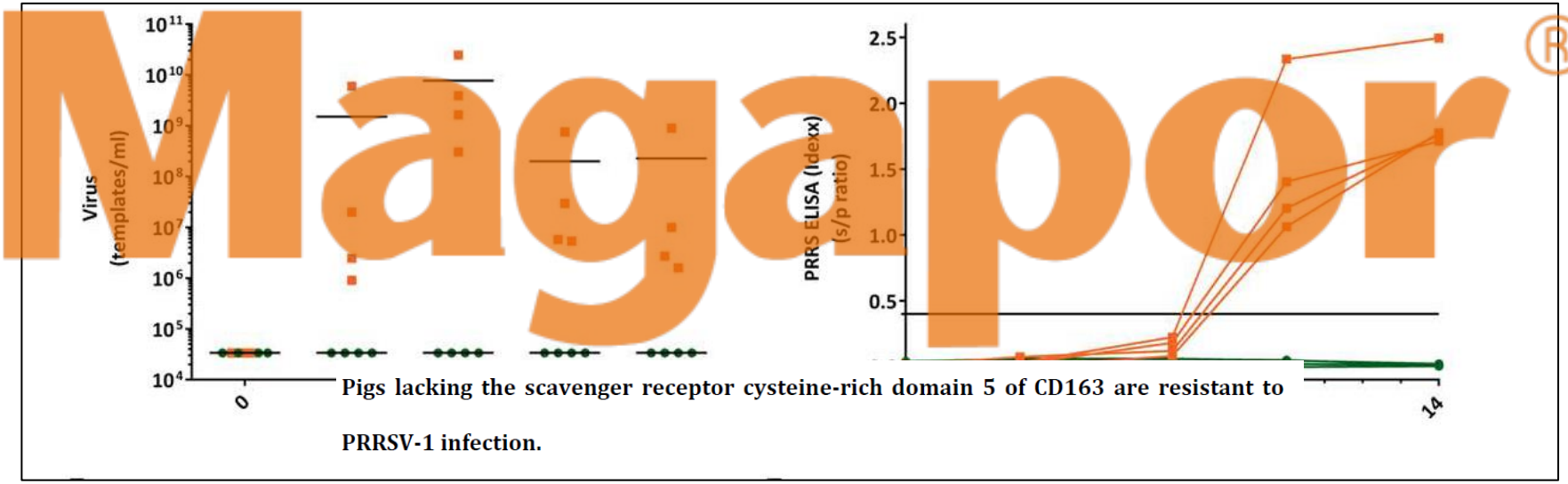
WOULD PRRSV-RESISTANT PIGS BE THE SOLUTION?

FDA approval does not automatically trigger commercialization in the U.S.

PRRSResistantPig.com

THE VIRUS NEEDS THE CD163 TO DEVELOP AN INFECTION

The virus needs a membrane receptor (CD163) on the alveolar monocyte/macrophage to enter in the cell and develop a successful infection. Pigs lacking the scavenger receptor cysteine-rich domain 5 of CD163 are resistant to PRRSV-1 infection in *in vivo* studies and PRRSV-1 and PRRSV-2 *in vitro* studies.



Pigs lacking the scavenger receptor cysteine-rich domain 5 of CD163 are resistant to PRRSV-1 infection.

2018 – Burkard et al.

OTHERS WILL FOLLOW…

In the coming years, more companies may begin offering PRRSV-resistant pigs..

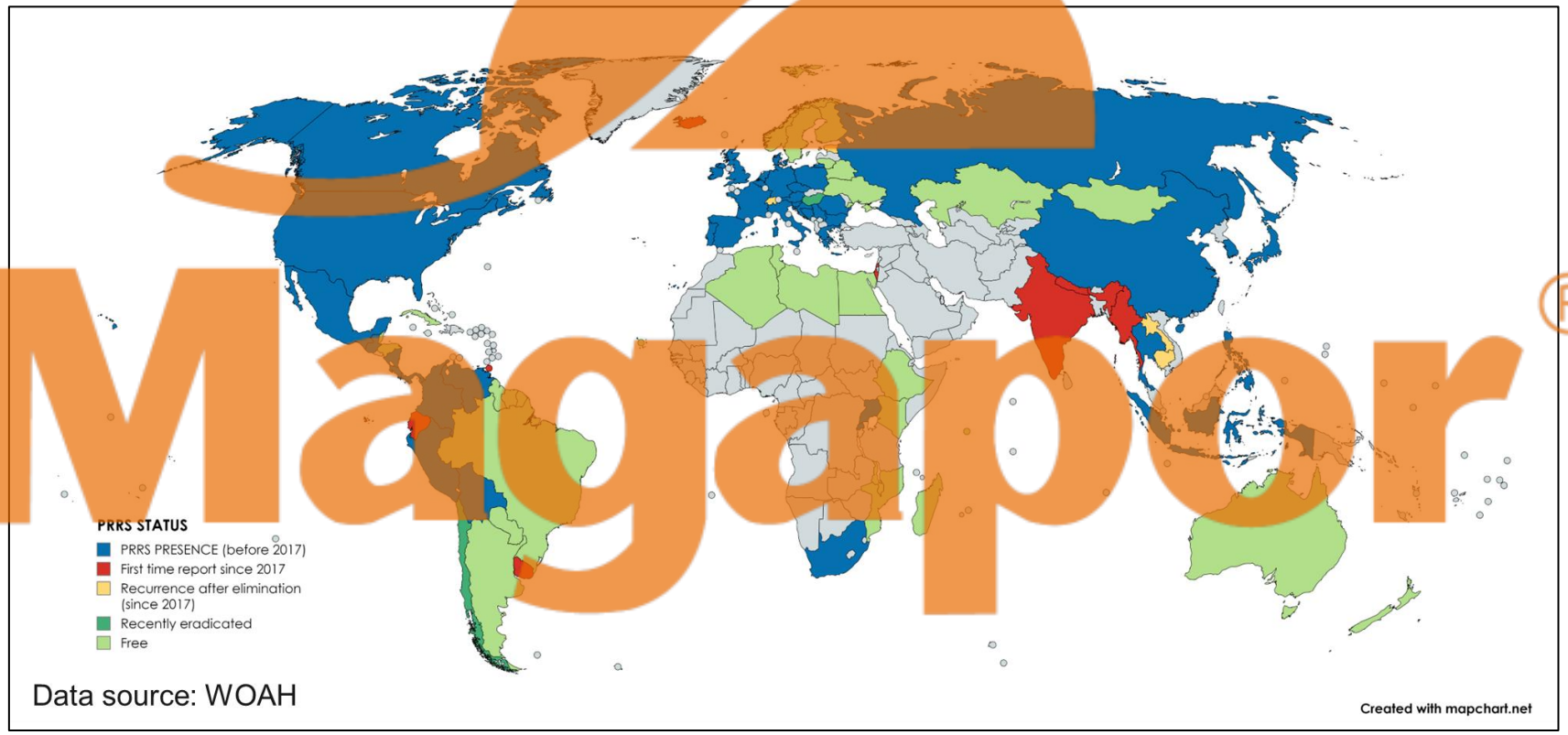
Genetically modified pigs with CD163 point mutation are resistant to HP-PRRSV infection

Ying Liu[1,#], Lin Yang[1,#], Hong-Yong Xiang[1,#], Ming Niu[1], Jia-Cheng Deng[1], Xue-Yuan Li[1], Wen-Jie Hao[1,2], Hong-Sheng Ou-Yang[1,2,3], Tong-Yu Liu[1], Xiao-Chun Tang[1], Da-Xin Pang[1,2,3,*], Hong-Ming Yuan[1,*]

Deletion of maternal CD163 PSTII-domain-coding exon 13 protects fetuses from infection with porcine reproductive and respiratory syndrome virus (PRRSV)

Raymond R.R. Rowland [a], Brianna Salgado [a], James Lowe [b], Tad S. Sonstegard [c], Daniel F. Carlson [c], Kyra Martins [c], Jonathan R. Bostrom [c], Suzanna Storms [b], Alberto Brandariz-Nuñez [a,*]

CURRENT PRRS SITUATION WORLDWIDE



CONTROL/ERADICATION OF PRRSV AT COUNTRY LEVEL

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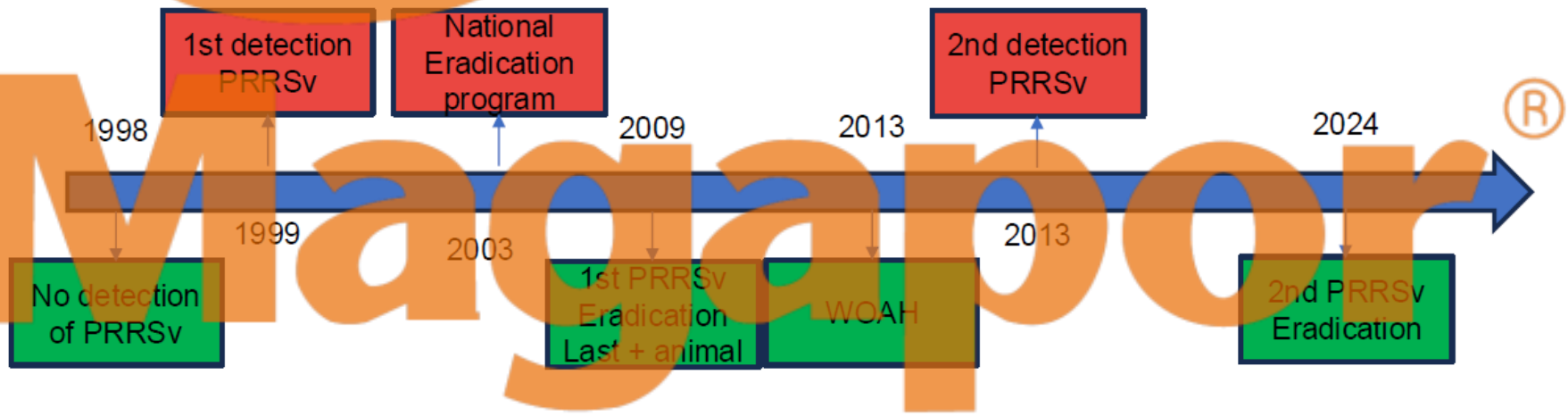
CHILE – COUNTRY CHARACTERISTICS AND SWINE PRODUCTION

- 20 M people
- CENSUS: ~2,8 M pigs (190K sows+2,6M growing pigs).
- 5,5 M pigs annually.
- Less than 25 stakeholders control over 95% of the production. < 250 farms
- 90% of swine production is concentrated in central Chile.
- Climate: Mediterranian. **Summer:** Warm and dry, 10°C to 33°C (50°F to 91°F), **Winter:** Cool and rainy, 5°C to 15°C (41°F to 59°F), with occasional frost
- Solid-liquid separation of manure. Composting solid part. No manure pumping.
- Rendering as a primary method for carcass disposal.

SOURCE: Victor Neira (Universidad de Chile)

CHILE – ERADICATION TIMELINE

Chile successfully eliminated PRRS from the national swine herd twice.



SOURCE: Victor Neira (Universidad de Chile)

CHILE – ERADICATION PLANS (2003 to 2009; and 2013 to 2024)

First PRRS Detection in Chile (1999):

- **Seropositive Farms:** 28 out of 96 swine farms tested positive.
- **Impact:** 22,500 sows across 12 swine companies. (13% of total sows)
- **PRRS 2 (89% VR2332)**

Eradication Program:

- Steve Henry & Montse Torremorell.
  - **No vaccination allowed**
  - **Total Depopulation:** Applied to one-site farms.
  - **Herd Closure:** Implemented in Site-1 of multi-site farms, with complete depopulation in nurseries and finishing sites.
  - **The last positive animal in 2009**
  - **Gilts were subsidized by producers**

PRRS Detection in Chile (October 2013):

- Sow Farm with 2,900 sows
- Near to an area with High density of pigs
- Infected backyard pigs.

Eradication Program 2014, similar to 2000's:

- **No vaccination allowed.**
- **Total Depopulation:** Applied to one-site farms.
- **Herd Closure:** Implemented in Site-1 of multi-site farms, with complete depopulation in nurseries and finishing sites.
- Using off-site nurseries and growing to finisher farms.
- **In this program backyard farms were included, positive were depopulated.**
- **The program works well except for two farms**
- **Gilts were not subsidized**

SOURCE: Victor Neira (Universidad de Chile)

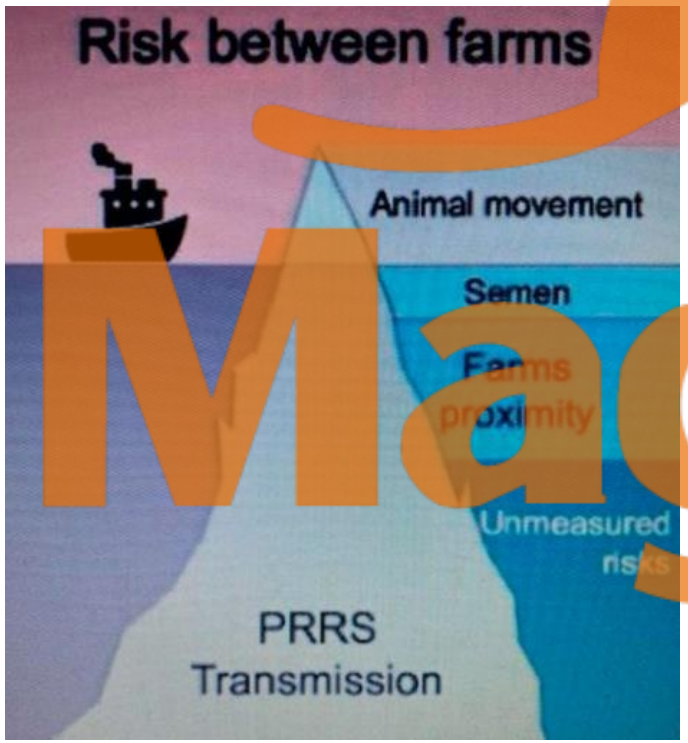
THE LAST TWO FARMS

After several attempts were made, September 2019 adapted plan

- Live virus inoculation for herd closure
- Increase and modernize the surveillance, using processing fluids and OF1 PF bag each 300 piglets (testicles),1 OF each 500 –1000 pigs
- Depopulation of growing pigs when stability was reached.
- Farms reached stability in 20 and 21 weeks.

SOURCE: Victor Neira (Universidad de Chile)

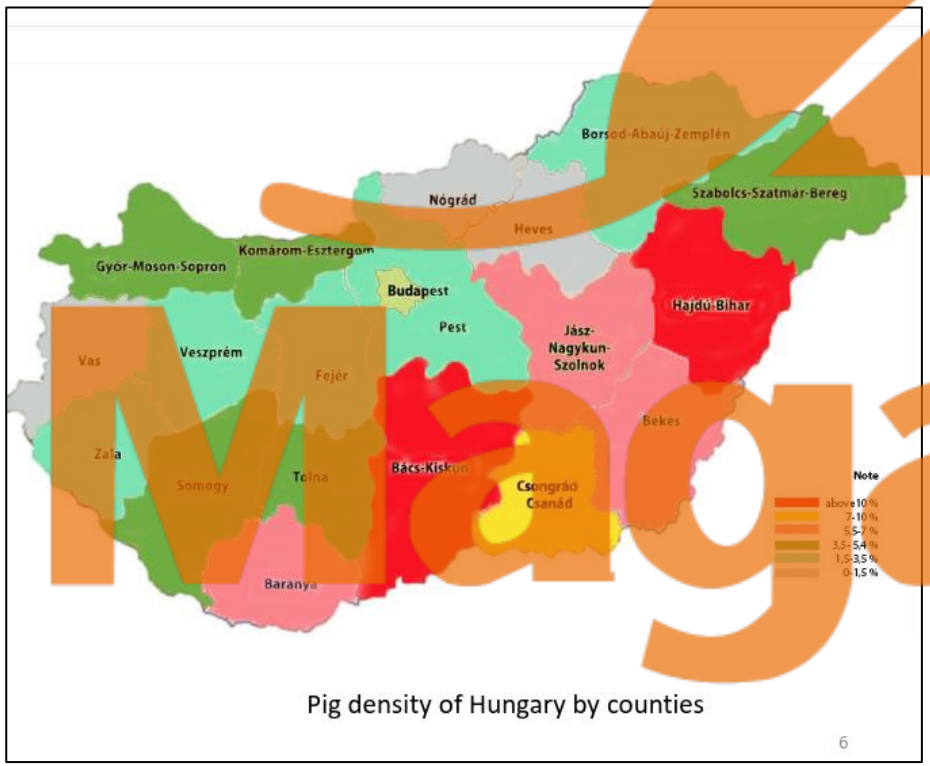
KEY TAKEAWAYS FROM CHILE'S PRRSV ERADICATION EFFORT



- Importance of collaboration between industry, government, and academia.
- Scenarios can change between countries
- Human behavior (backyard pigs)
- Climate
- Use of LVI

SOURCE: Victor Neira (Universidad de Chile)

HUNGARY – COUNTRY CHARACTERISTICS AND SWINE PRODUCTION



Pig density of Hungary by counties

- 10 M people
- CENSUS: ~2,8 M pigs (250K sows+2,5M growing pigs).
- Imports ~600K pigs each year
- 4,7 M slaughtered pigs annually.
- 800 farms
- Large scale, farrow-to-finish herds. Lack of AIAO. High stock densities.
- Continental climate with hot dry summers and mildly cold snowy winters

SOURCE:
333 https://www.pig333.com/pig-production-data/hungary_26/
SZABO, ESPHM 2022

HUNGARY – ERADICATION PLAN (2014-2022)

- Communication with stakeholders
- Establishing legislation (Mandatory eradication)
- Backyard farms: Serology of every individual animal. Removal of positive animals
- Fattening pigs: 5% prevalence/95% CI per air space. Once empty only PRRSV free animals. Starting point: 61% PRRS positive in 2014
- Breeding herds and farrow-to-finish monitored every 6 months. 10% prevalence/95%CI.
- Breeding herds could decide the eradication method (depop-repop; herd closure; test and removal). Starting point: 27% PRRS positive in 2014
- Vaccine allowed but only in breeding herds. Eventually to be removed.
- From lowest to highest density regions.
- State paying compensations and testing.

SOURCE: SZABO, ESPHM 2022

KEY TAKEAWAYS FROM HUNGARY'S PRRSV ERADICATION EFFORT

- Experts Committee
- Effective and transparent communication with government agencies and swine industry players.
- it is not the small, backyard farms that pose a risk of infection to the large ones, but vice versa
- Depop-repop was the most common method for eradication.
- The three main identified risks as potential ways of new introductions were: Slaughterhouse transport, rendering and closeness to farms with positive imported pigs.

SOURCE: SZABO, ESPHM 2022

DENMARK – COUNTRY CHARACTERISTICS AND SWINE PRODUCTION

- 6 M people.
- CENSUS~12 M pigs (1M sows+11M growing pigs).
- No pig imports.
- 14 M slaughtered pigs annually and 16M 30kg pigs exported.
- 4300 farms
- Large scale, farrow-to-finish herds.
- Atlantic and continental climate with warm moderate summers and mildly cold snowy winters

SOURCE: NICOLAI WEBER, LANDBRUG AND FODEVARER

PRELIMINARY WORK DONE

- Specific Pathogen Free (SPF) System (1968):
  - Voluntary
  - 7 swine Diseases (Lice, mange, swine dysentery, atrophic rhinitis, APP serotype 2, enzootic pneumonia and PRRS).
  - Transparency: Health status of SPF herds available online for all stakeholders.
  - 80% of the breeding herds were already in the SPF program
  - Testig depending on the farm type (nucleus, multipliers, sow herds and finishers).
  - Good data systems (Health, trade and geographical location).

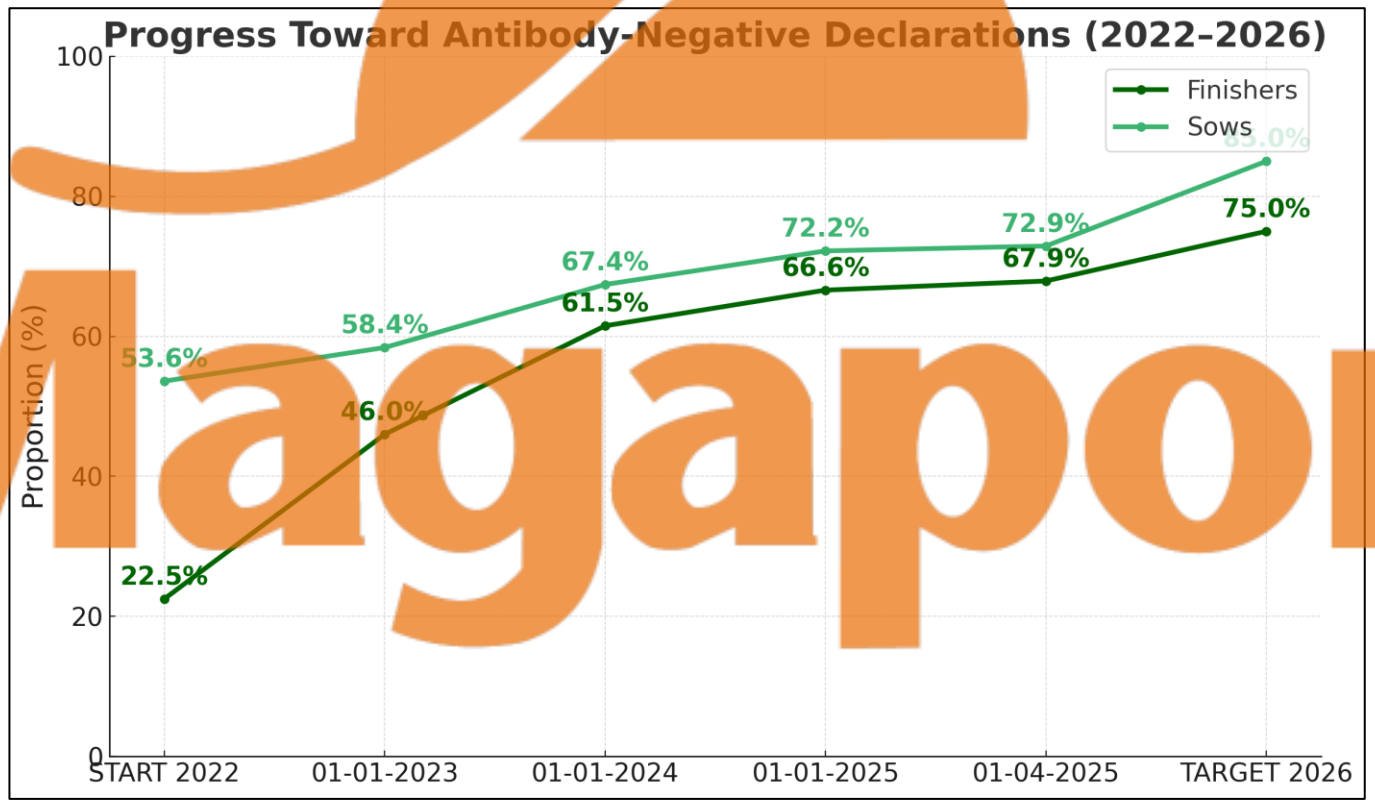
SOURCE: NICOLAI WEBER, LANDBRUG AND FODEVARER

DENMARK – PRRSV CONTROL PROGRAM (2022 to ???)

- PRRSV Status declaration 4500 herds. (Finishers 75% POS – GOAL2026: 25% POS; Sows 42% POS – GOAL2026: 15% POS)
- Organized at different levels (National, Regional and district).
- Economical pressure on PRRSV positive herds.
- AASV recommendations for stabilization (LCH, close for 210 days, MLV allowed but eventually restricted, no LVI, McRebel and frequent monitoring) and empty nurseries.
- Digital support (mapping, eradication plan, farm status, daily updates and transparency).

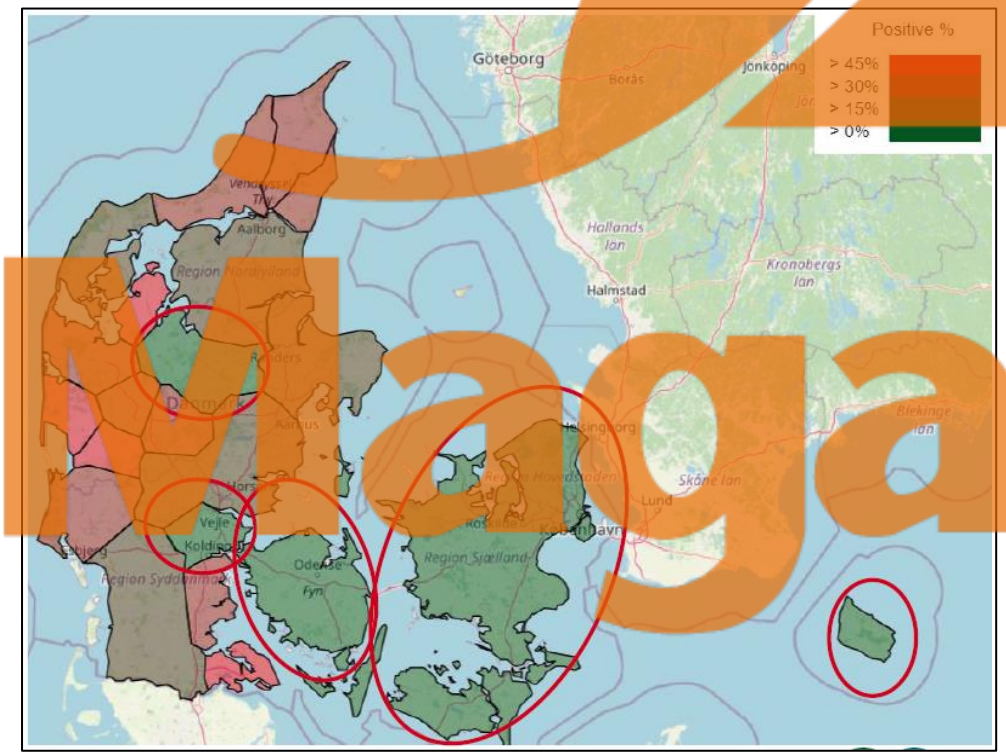
SOURCE: NICOLAI WEBER, LANDBRUG AND FODEVARER

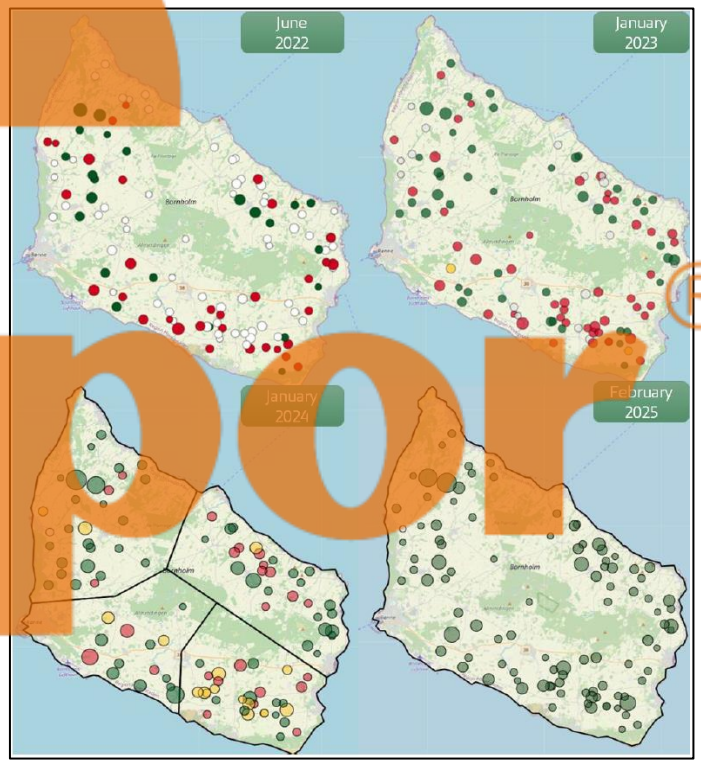
DENMARK – CURRENT PRRSV STATUS



SOURCE: NICOLAI WEBER, LANDBRUG AND FODEVARER

DENMARK – CURRENT PRRSV STATUS





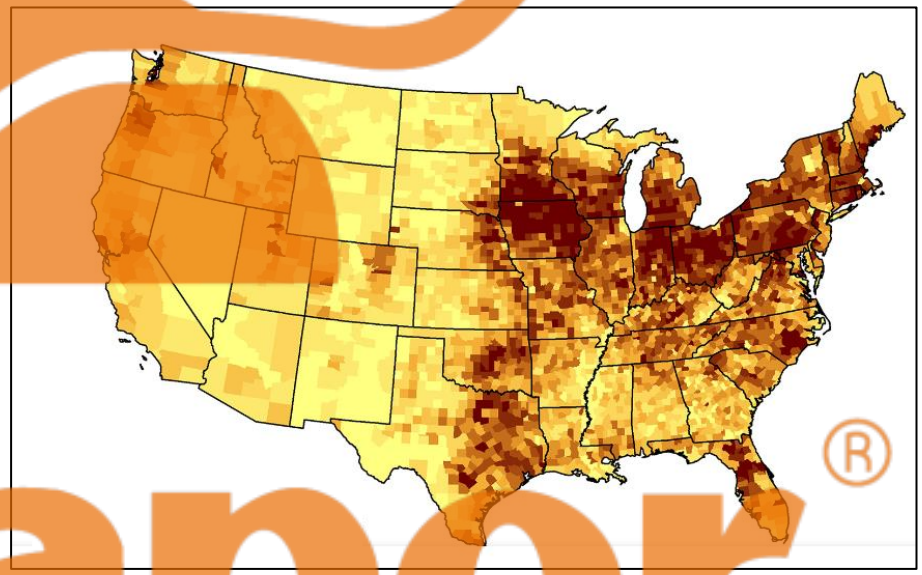
SOURCE: NICOLAI WEBER, LANDBRUG AND FODEVARER

KEY TAKEAWAYS FROM DENMARK'S PRRSV CONTROL EFFORT

- Involvement of all stakeholders (Pig farmers, veterinarians, authorities, meat-packing plants)
- Regionalization
- SPF infrastructure
- Mandatory declaration
- Cooperation from farmers
- Transparency and sharing of data

SOURCE: NICOLAI WEBER, LANDBRUG AND FODEVARER

USA – COUNTRY CHARACTERISTICS AND SWINE PRODUCTION



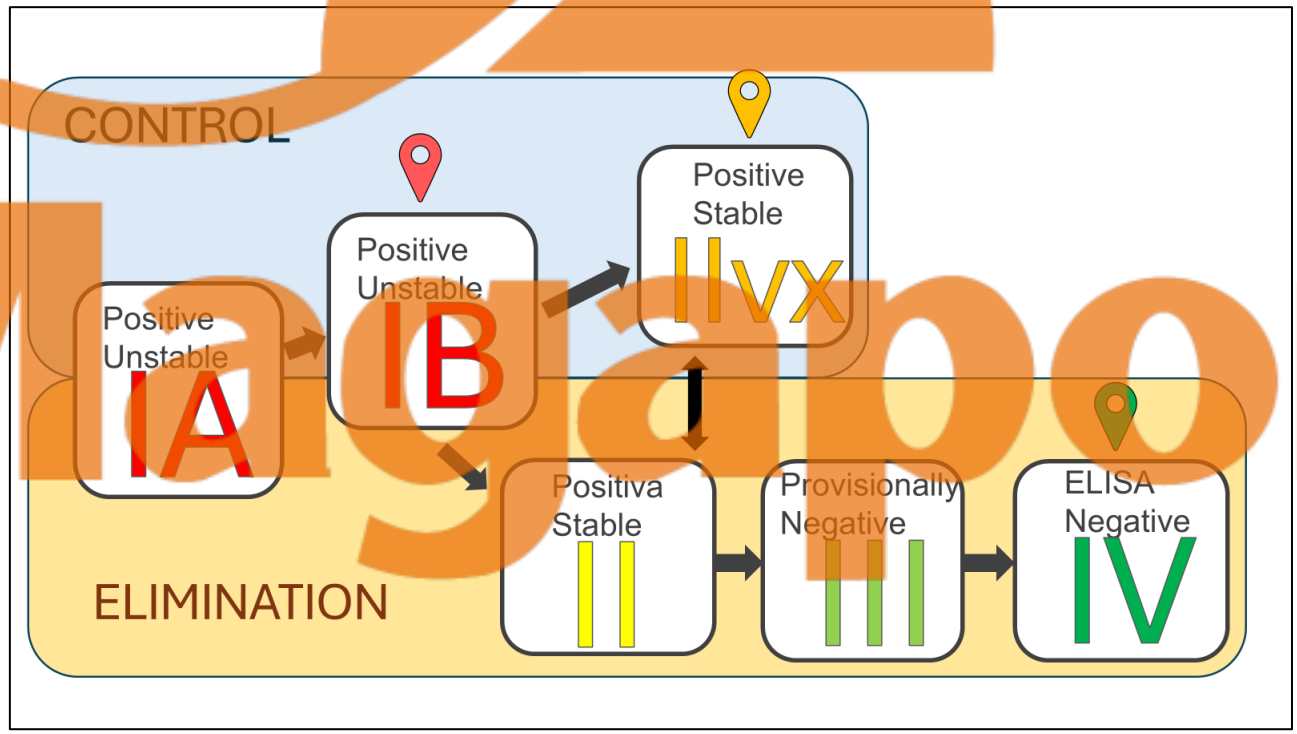
- 340 M people
- CENSUS~75 M pigs (6M sows+70M growing pigs).
- Imports around 6M pigs each year from Canada.
- 130 M slaughtered pigs annually.
- Most of the farms located in the Midwest or North Carolina
- Large scale operations.
- Top 36 companies own 70% of the sows
- Top 5 companyies own 33% of the sows

NO OFICIAL CONTROL PLANS BUT LOTS OF INITIATIVES

- AASV PRRSV task Force. Developed a methodology to sample and classify PRRS herds according to status.
- AREA REGIONAL PRRSV ELIMINATION PROJECTS.
- Morrison Swine Health Monitoring Project (UMN).
- Swine Disease Reporting System (ISU).
- RABapp (NCSU)

AASV PRRSV CLASSIFICATION GUIDELINES

Roadmap to either control and eradicate with sample size and frequency guidelines



HOLTKAMP et al. 2021

AREA REGIONAL VOLUNTARY PRRSV CONTROL AND ELIMINATION PROJECTS.

10 Commandments of regional PRRS control

1. Monitor frequently your herd. Sequence if possible.
2. Share your PRRSV status. Disclose your status with regional participants, neighbors and coordinator.
3. Communicate and cooperate—with veterinarians, neighbors, and regional coordinator.
4. Increase your biosecurity
5. AI/AO whenever is possible.
6. Buy negative—boars, semen, replacements, and pigs.
7. Eliminate wild virus from your herd. Herd Closure or Depop-Repop
8. Work with your veterinarian.
9. Respect your neighbor. You can get infected too. Build trust.
10. Protect the sow herds.

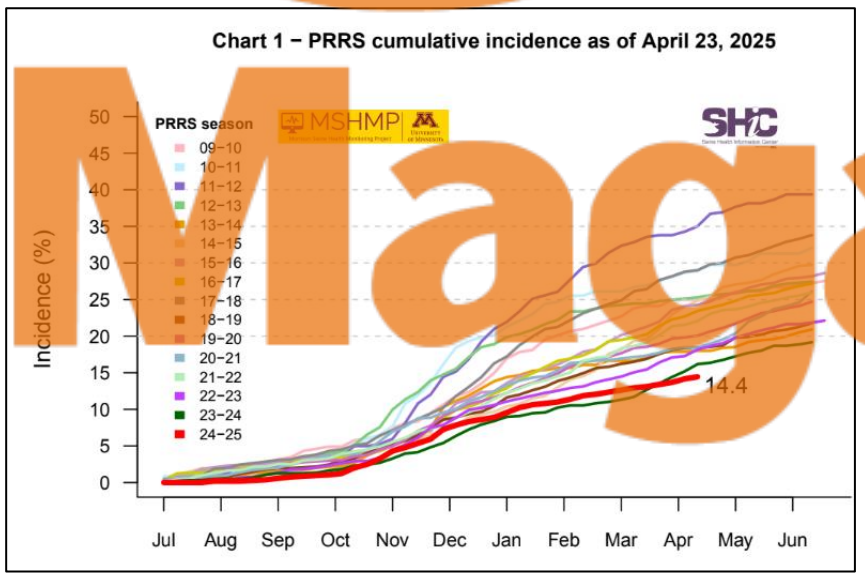
Limitations

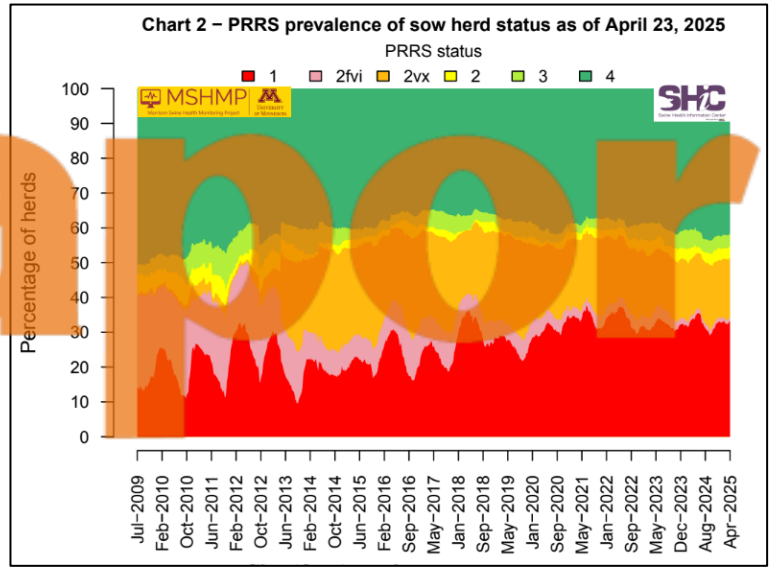
1. Voluntary participation. Not 100% participate.
2. Not frequent testing
3. Not frequently reporting
4. Lack of decisions at some point.

SOURCE: Dave Wright 2016

MORRISON SWINE HEALTH MONITORING PROJECT (MSHMP)

The Morrison Swine Health Monitoring Project (MSHMP) is a producer-driven voluntary program led by the University of Minnesota.
The MSHMP collects PRRS incidence, prevalence and sequence information from 50% (3M) of the U.S. swine breeding herd (6M).

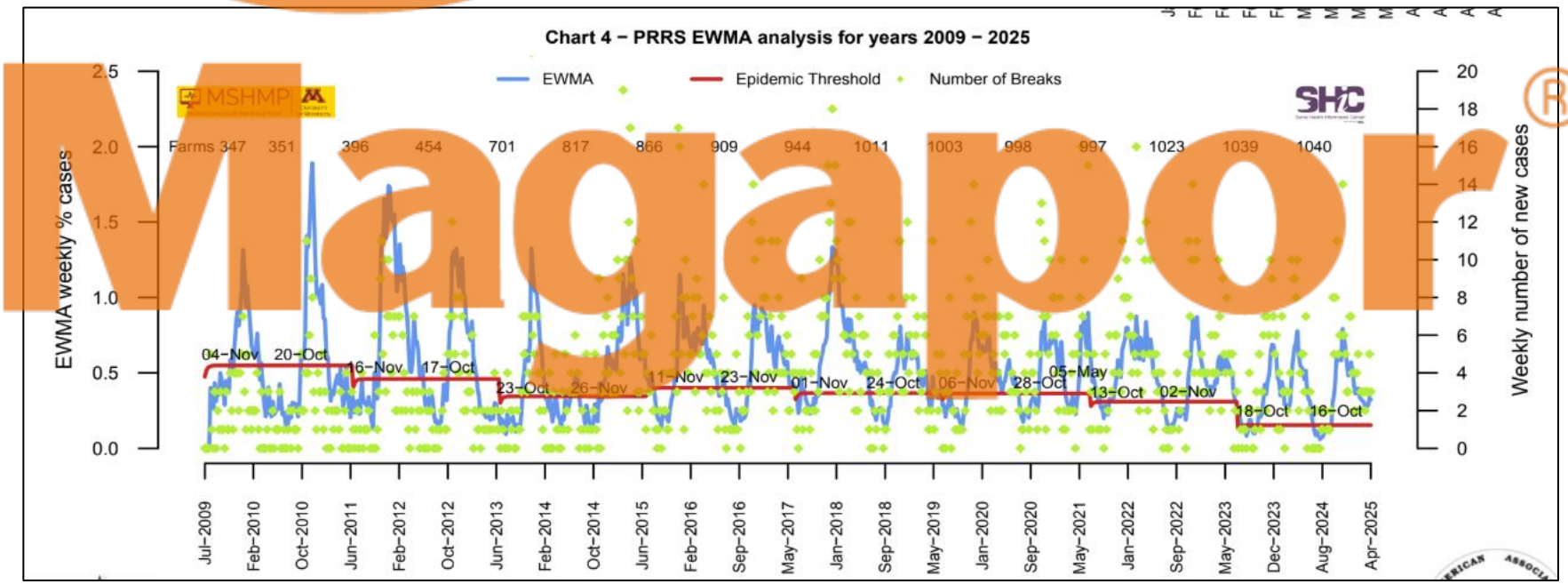




MORRISON SWINE HEALTH MONITORING PROJECT

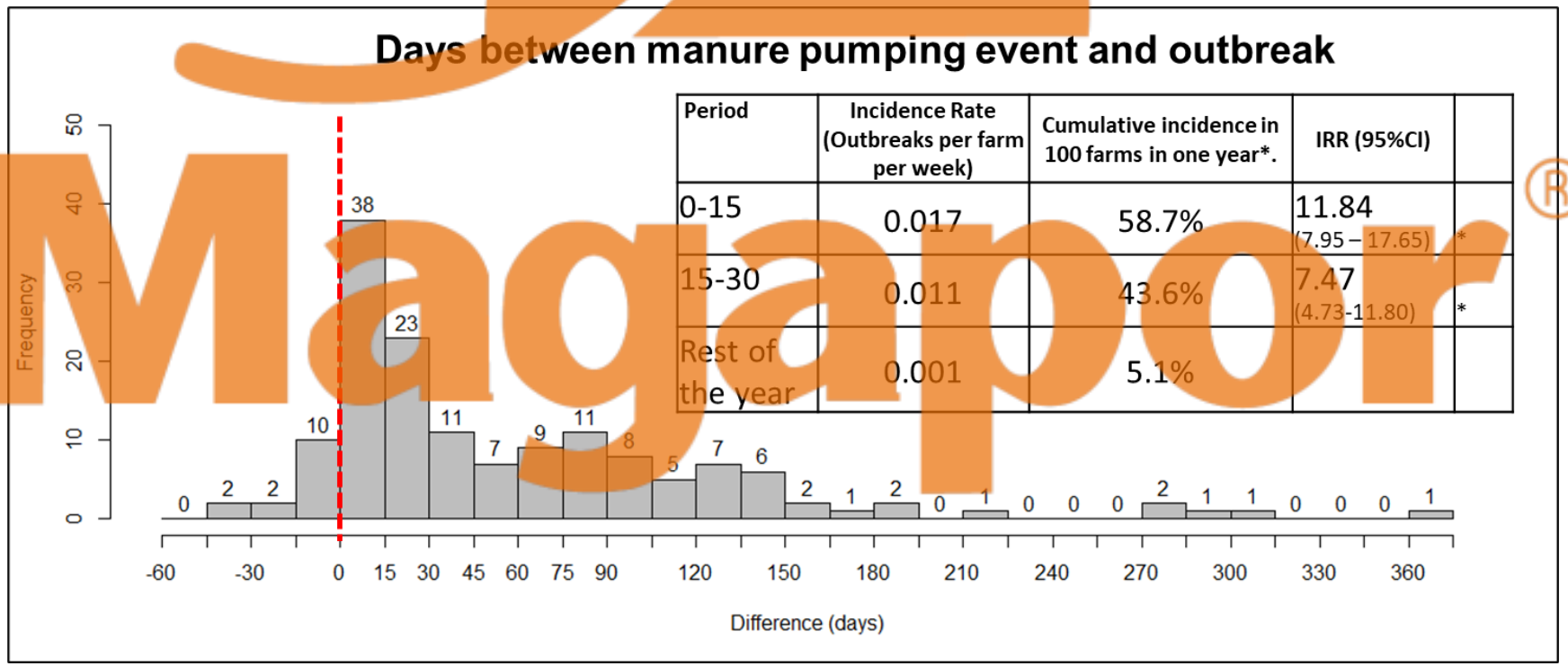
PRRS is seasonal and cyclical. Fall is when most of the breaks are reported.

However, there is second peak of PRRS outbreaks during late spring- early summer that is not always apparent.



MANURE AS POTENTIAL RISK

The percentage of breeding herds breaking with PRRSV within the 15- and 30-day period after pumping were 25% and 40.6%.



Period	Incidence Rate (Outbreaks per farm per week)	Cumulative incidence in 100 farms in one year*.	IRR (95%CI)	
0-15	0.017	58.7%	11.84 (7.95 – 17.65)	*
15-30	0.011	43.6%	7.47 (4.73-11.80)	*
Rest of the year	0.001	5.1%		

MANURE AS POTENTIAL RISK

In a recent study (2024) assessing the manure pumping effects on disease onset in wean-to-finish pig sites, Linhares and Silva found:

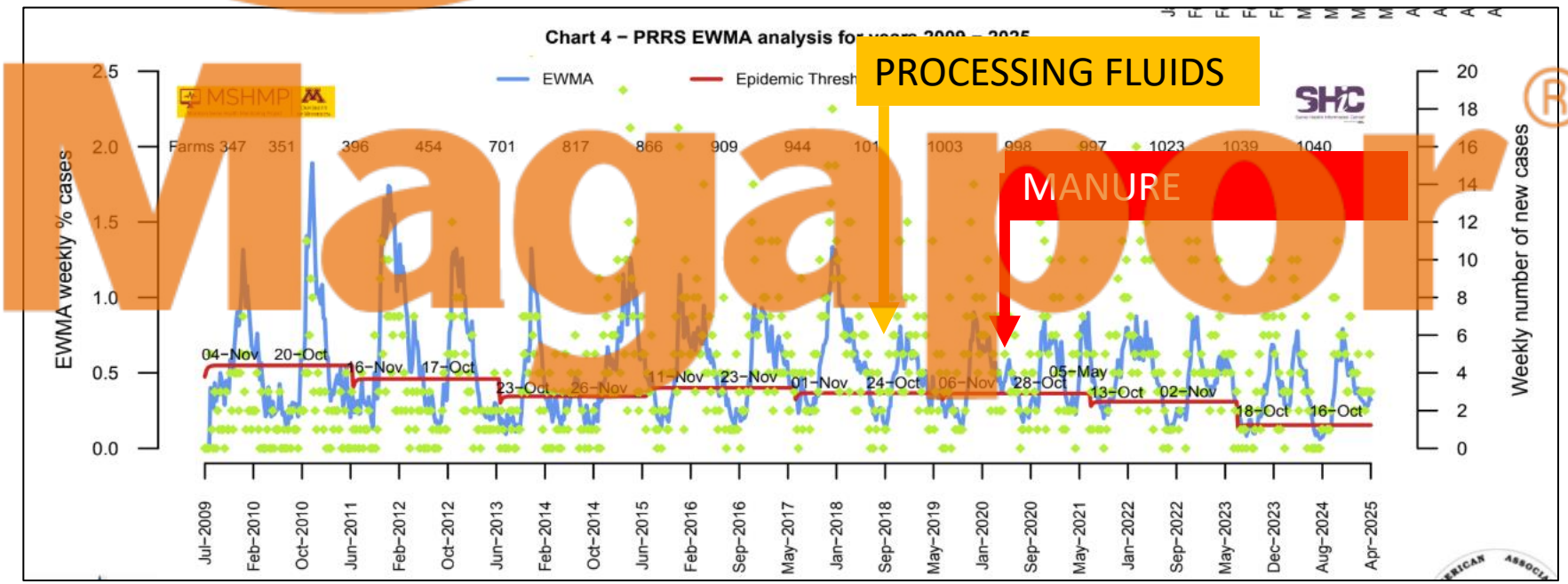
- that **manure pumping practices were associated with PRRSV outbreak and spread**. The odds of a PRRSV outbreak within a 4-week window were greater when the site was pumped and was in close proximity to a field receiving manure.

- the odds of a previously PRRSV-negative barn becoming PRRSV-positive increased significantly after manure pumping

MORRISON SWINE HEALTH MONITORING PROJECT

PRRS is seasonal and cyclical. Fall is when most of the breaks are reported.

However, there is second peak of PRRS outbreaks during late spring- early summer that is not always apparent.



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CONSIDERATIONS FOR PRRSV ELIMINATION

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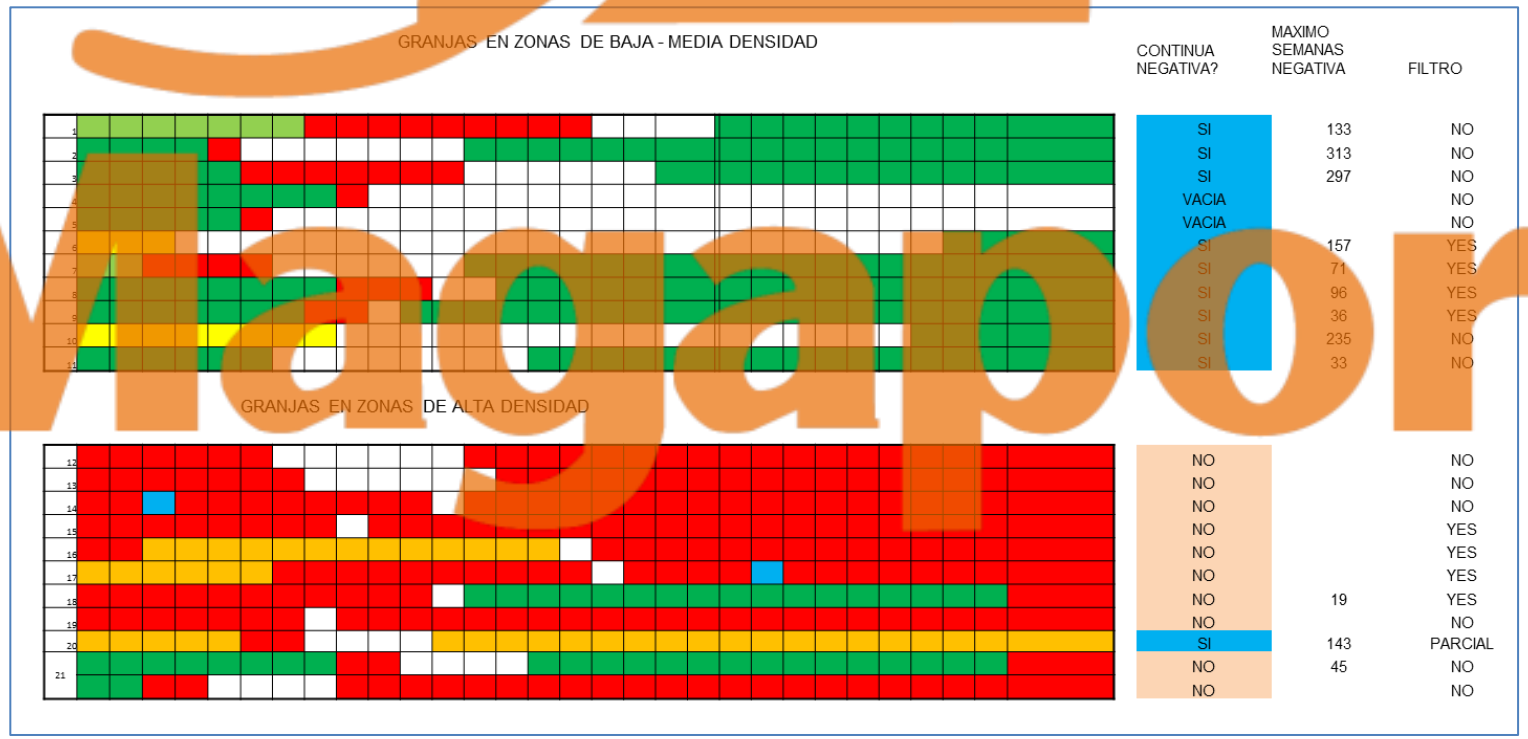
WE ALREADY HAVE THE TOOLS FOR ERADICATION

LOAD-CLOSE-EXPOSE and Depop-Repop are methods that could be used for PRRSV elimination.

- LOAD the herd with all replacement animals for the closure period.
- Aim to CLOSE the farm for 7-8 months.
- Establish your day 0.
- Monitor extensively
- Apply MCRebel in low prevalence scenarios.
- Clean and disinfect properly.
- Empty, clean and disinfect the nursery and the finisher, if any on the premises.
- Get rid of all the sows present during the outbreak.
- Ideally, work towards the good weather.

BUT ALSO WE NEED TO PREVENT NEW BREAKS.

Biosecurity is key but the neighborhood density is important.



Fuente: Swine Health Monitoring Project

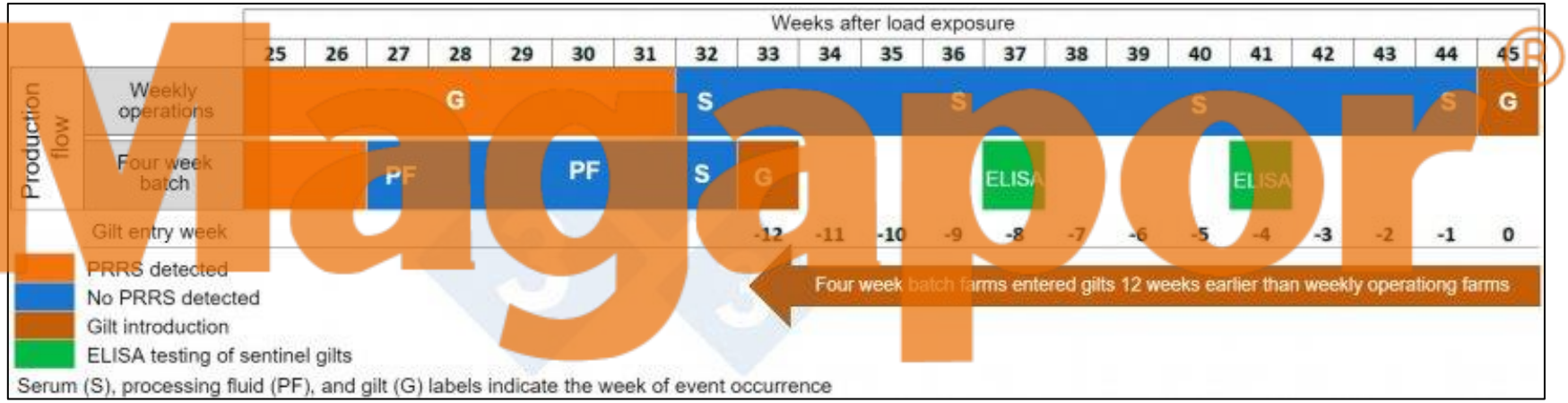
MONITOR EXTENSIVELY

Monitoring will give you confidence of the true status of the disease in the farm and will reduce the risk of future decisions (e.g. New gilt introduction after closure).

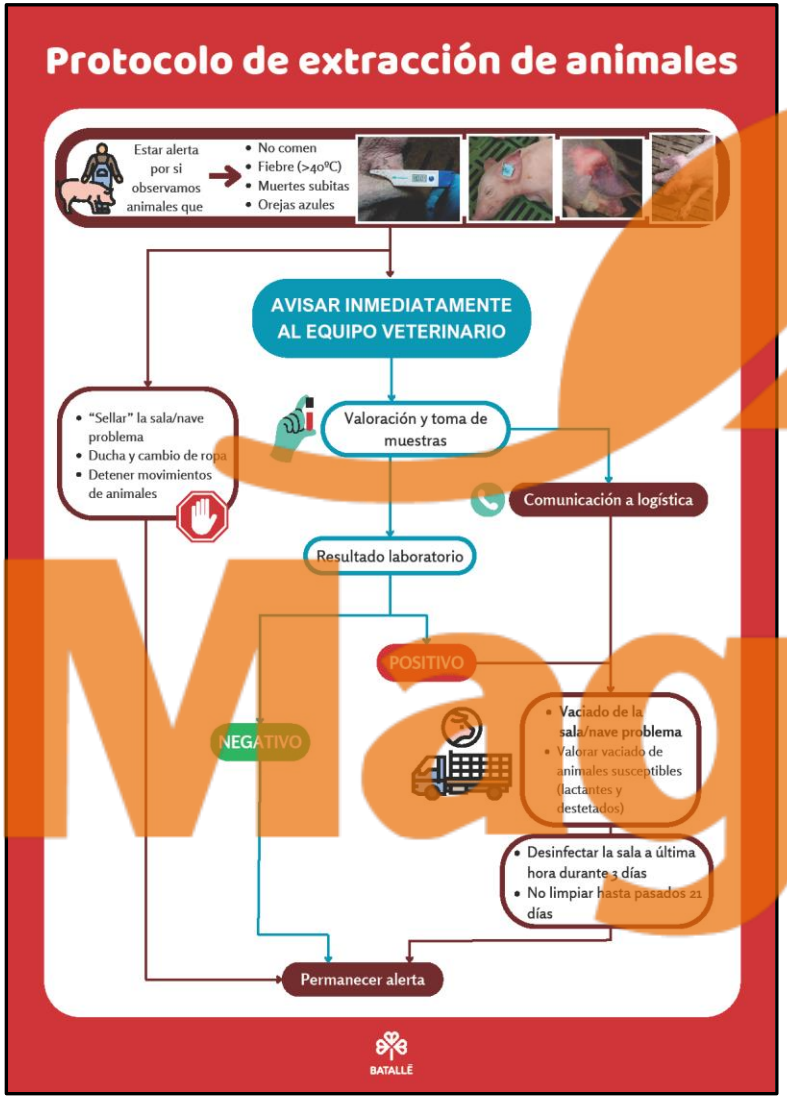
	Sensitivity	Cost €	Work
Serum (Pools)	+++	++/+++	+++
Blood swabs (Pools)	++	++/+++	++
Oral swabs	++	++/+++	++
Family oral fluids (FOF)	++	++	++
Placenta and umbilical cord (PUC)	++	++	++
Processing fluids (FP)	+++	+	+
Tongue tip fluid (TTF)	+++/++	+	+/++
Environmental sampling	+	+	+
Tonsil-oral scrapping (TOSC)	+++	++/+++	++++

BATCH FARROWING CAN BE OUR ALLY

Farms working under the batch farrowing system reach stability (TTS: 27 vs 32) faster in LCE which means gilt introduction and return to productivity faster.



https://www.pig333.com/articles/how-is-batch-farrowing-systems-affecting-the-outcome-after-prrs_20775/



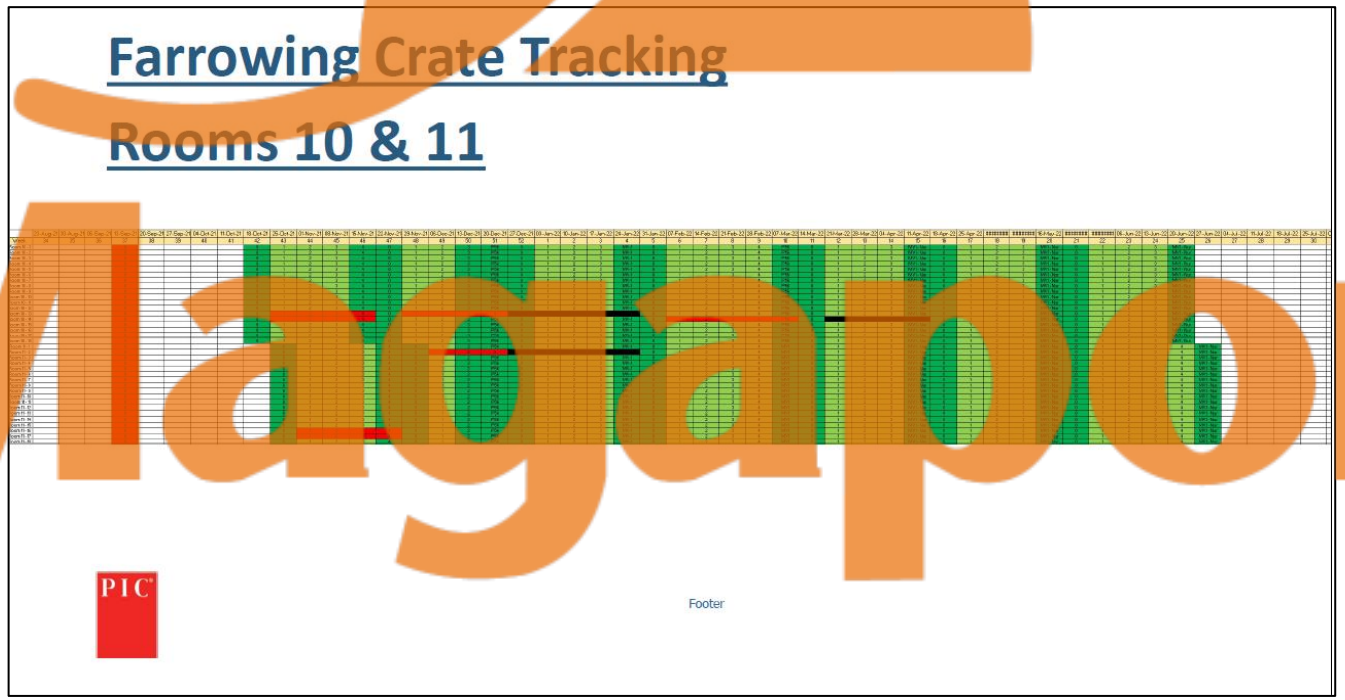
Batallé

BATCH FARROWING WITH CLINICAL SIGNS MONITORING

Training personnel to detect early signs of PRRSV infection can reduce the impact of the disease and avoid the infection of the farm.

CLEAN AND DISINFECT PROPERLY

Watch out for environmental contamination! Clean and disinfect properly. If possible, apply heat.



Courtesy: Tim Snider (PIC)

COULD WE USE ALTERNATIVE METHODS FOR ELIMINATING PRRSV IN LOW PREVALENCE FARMS?

Test and removal methods were used succesfully in the past.

Epidemiological and diagnostic observations following the elimination of porcine reproductive and respiratory syndrome virus from a breeding herd of pigs by the test and removal protocol

S. A. Dee, T. W. Molitor, K. D. Rossow

TABLE 1: Criteria for the removal of animals from the farm

ELISA	PCR	Interpretation	Decision
+	+	Viraemic	Remove
+	−	Exposed/infected?	Remove
−	+	Viraemic	Remove
−	−	Uninfected	Retain

TABLE 2: Diagnostic characteristics of the sows removed from the farm

Number in breeding herd	825
Number (%) removed	88 (10·7)
ELISA+/PCR+	3
ELISA+/PCR−	85
ELISA−/PCR+	0
ELISA−/PCR−	737

Dee et al., 2000

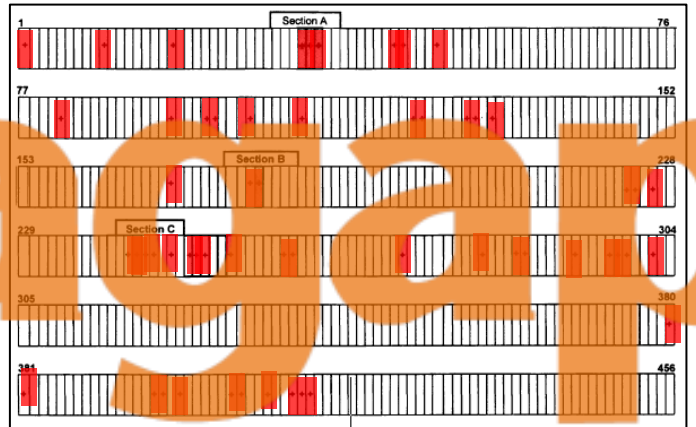


FIG 1: Location of animals removed from the gestation facility. Each box represents a sow in a gestation stall. Boxes with a '+' sign indicate animals removed. Shaded boxes indicate animals with positive PCR results. Animals in section A were serum PCR-positive and the animal in section B was tissue PCR-positive

An evaluation of test and removal for the elimination of porcine reproductive and respiratory syndrome virus from 5 swine farms

Scott A. Dee, Michael D. Bierk, John Deen, Thomas W. Molitor

Table II. Diagnostic data of removed animals from Test and Removal study farms

Farm #	# Tested	# Removed	ELISA+ PCR+	ELISA+ PCR−	ELISA− PCR+	ELISA− PCR−
1	792	66 (8.3%)	1	64	1	726
2	812	77 (9.5%)	6	69	2	735
3	825	88 (10.7%)	4	84	0	737
4	1095	23 (2.1%)	0	23	0	1072
5	318	22 (6.9%)	4	17	2	296
Mean	769	55 (7.2%)	3	51	1	713
% of removed			5.5	92.7	1.8	

Dee et al., 2001

FINAL REMARKS

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FINAL REMARKS

- During the eradication is necessary to monitoring properly (status and sequences).
- The involvement of all stakeholders is essential in any national-level eradication program.
- A solid legal framework and clearly defined goals are essential.
- Effective communication and transparency are crucial.
- Digital tools can help accelerate the eradication of any disease.
- We already have the necessary tools to eradicate the disease at the farm level.
- Collaboration and coordination among neighbors is key.
- The commercialization of PRRSV-resistant pigs could be a game changer.

THANKS

GRACIAS

carles.Vilalta@irta.cat