The Guilty Gilt Guide

Boehringer Ingelheim

Life forward

The Guilty Gilt Guide

Boehringer Ingelheim

Professor Daniel C. L. Linhares

Veterinary Degree and MBA in Brazil
PhD in Veterinary Population Medicine in the US

Worked for 8 years in the industry on health services, product validation, supply chain, and technical services. Since 2015 he is an Associate Professor and Director of Graduate Education at Iowa State University.

Leads a team of multiple graduate students working towards improving health & productivity of swine populations under field conditions. His group has over 300 publications/participations on meetings over the last 5 years, having worked closely with veterinarians and pig producers in Canada, USA, Mexico, China, Spain and Brazil.

Dr. Marius Kunze

Veterinarian

Before joining Boehringer Ingelheim in 2014, I started my career as a pathologist focusing on swine diseases. After working as a technical service veterinarian, my responsibilities have shifted, since 2019 I support globally our PRRS and PPV brand.

A great benefit of my profession is to help producers improving their performance with innovative and flexible solutions in disease control. Collaborating with Global swine experts, and share the outcome of their field applicable research with veterinarians and producers is an important and fun part of my job.

Tailoring gilt health & immunity is probably the single most efficient task to control infectious diseases and therefore achieve the true genetic potential under field conditions.
Focussing on this first part of the production and infectious cycle - our gilts - will lead to a smooth stabilization of sow herds and will inevitably improve the whole-herd performance.
From breeding to farrowing to grow-finish.
Even though this topic is of utmost relevance, we felt that there was little structured and practical information available.
This guidbook aims to close this gap and deliver hands-on practical information.
We have made an effort to keep it straightforward and targeted.
We hope you enjoy it as much as we do.

In any case, please reach out to us if you want discuss further.

Happy reading and all the best.
Daniel and Marius

Global PRRS Solutions

Boehringer Ingelheim

Introduction

How to get the best use out of this book?

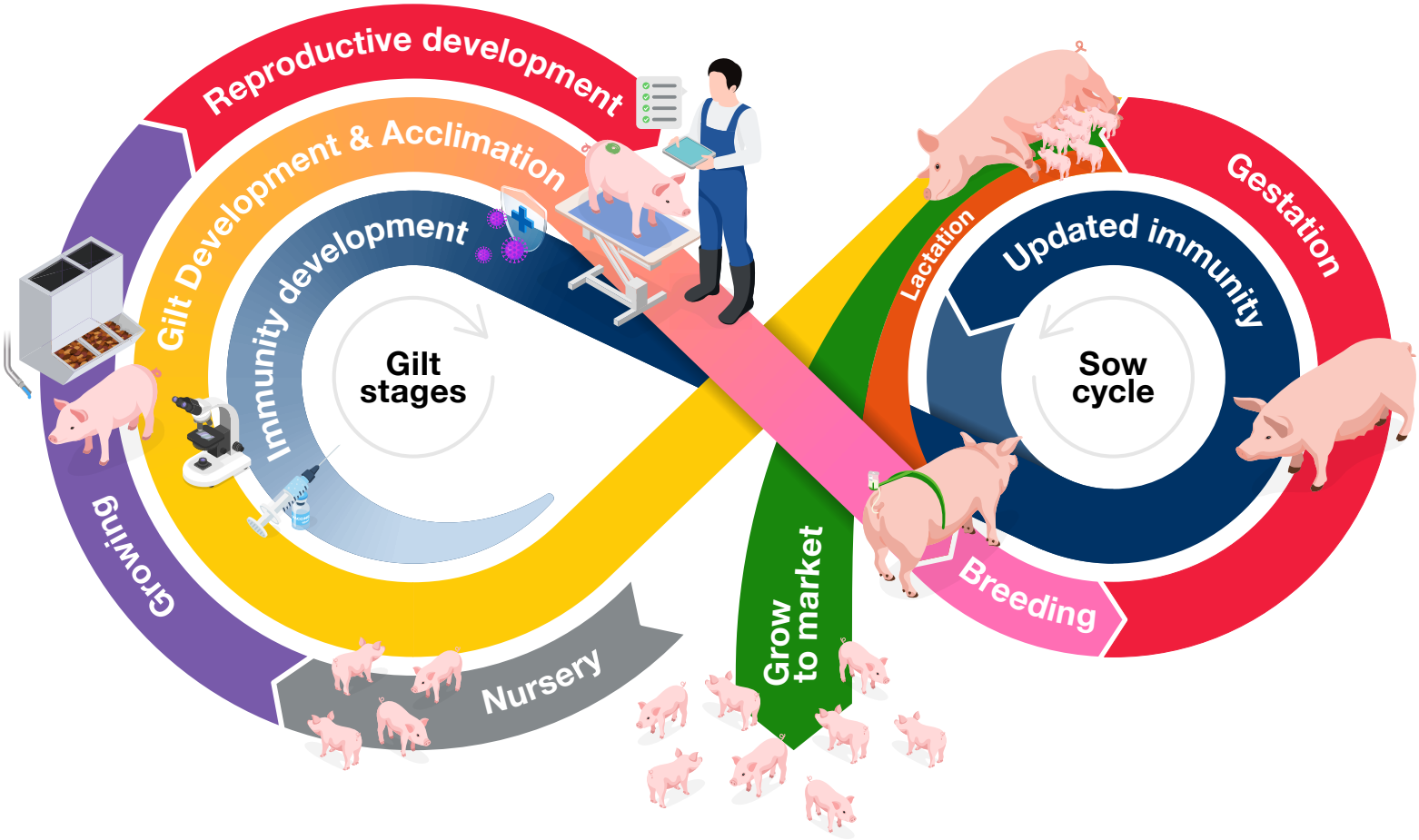
The Guilty Gilt Guide was written with a clear objective – to maximize the whole-herd performance of pig populations by helping gilts to reach their full reproductive potential and produce healthy pigs that reach their full genetic potential during grow-finish.

Gilt are the cornerstone of breeding farms. Unhealthy gilts, or gilts lacking proper herd immunity to endemic pathogens will result in sub-optimum reproductive performance. Also, it is well documented that the grow-finish growth performance and survivability are strongly correlated with the gilt and breeding herd health status.

In other words, poorly acclimated gilts will result, sooner (breeding herd) or later (grow-finish) in poor herd performance.

Index

1.1 Gilt to Sow cycle

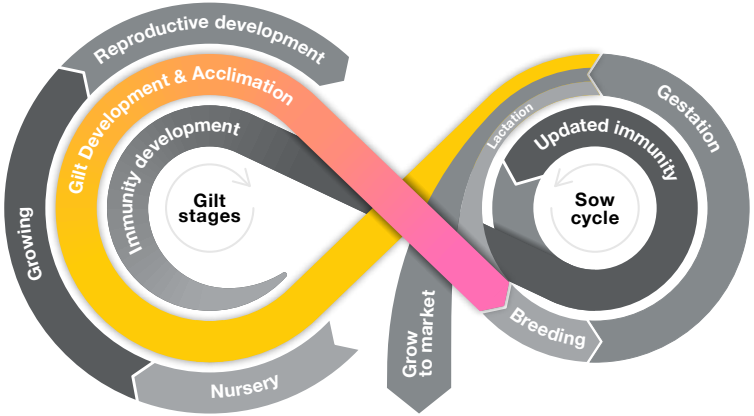


1.2 Milestones of gilt development

This sentence is frequently heard when discussing strategies related to replacement gilt management. There is no doubt this is a true statement but nevertheless the demanding routine and eventual labor shortages faced by some farms quite often create situations where the gilt development & acclimation phase is given a lower priority.

Gilt preparation describes the period in a replacement female´s life. A successful gilt preparation program is crucial to producers because it has a direct effect on the breeding herd's lifetime reproductive performance. Gilts can and should be the best reproductive performers on the farm. Also, breeding herds should not experience the 'parity 2 dip', defined as a drop in total born/litter in P2 compared to P1. To achieve this, the gilt populations should be well managed, including building immunity, physical development, and reproductive preparation.

In general terms, the gilt preparation can be sub-divided into 2 major concepts: the gilt development and the gilt acclimation. Even though these two things may happen simultaneously, the former focuses on the physical, nutritional, and reproductive aspects of the gilt, and the latter is about developing proper immunity to key pathogens affecting the herd.

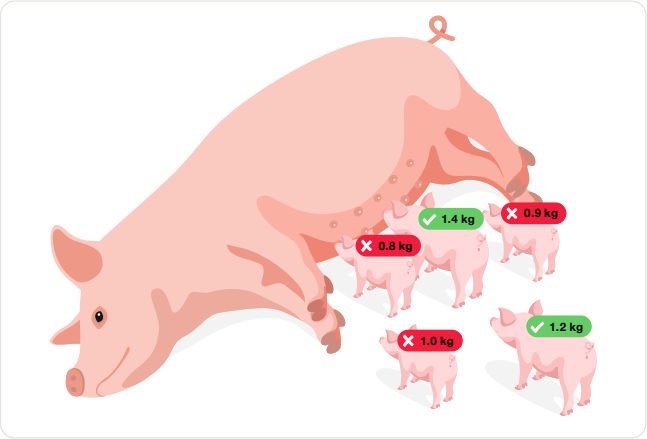


1.2 Milestones of gilt development

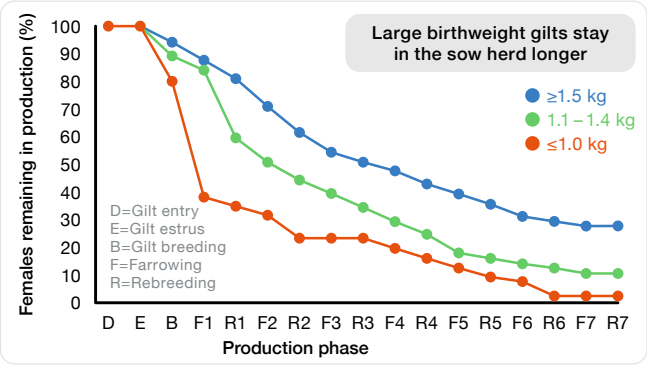
Key aspects associated with optimum gilt development

Flowers et al., 2008 ↗

Birthweight

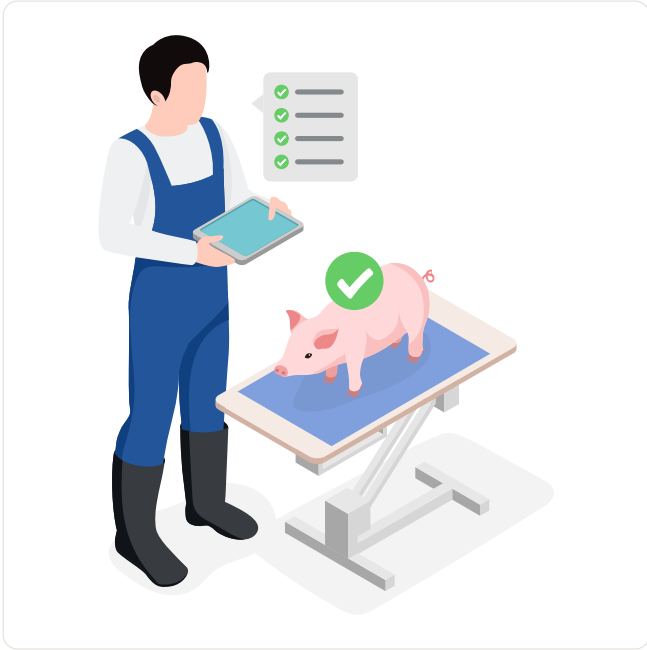


- Ideally > 1.5 kg, not lighter than 1.1 kg



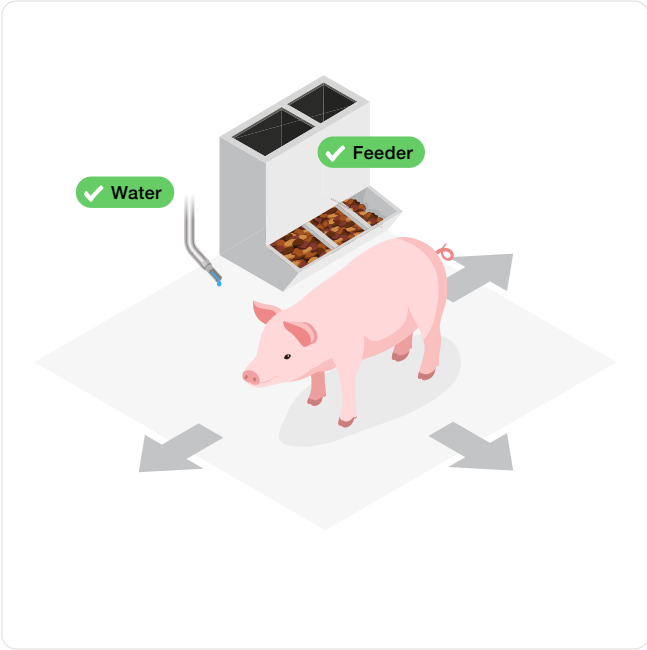
Graph 16. *Flowers et al., 2008* demonstrated the correlation between birth weight and the number of parities in sows.

Selection



- Select for physical attributes such as 14+ teats, body conformation, feet and legs structure and conformation, adequate growth (750 – 850g ADG), vulva (not infantile, injured, or tipped).

Growing



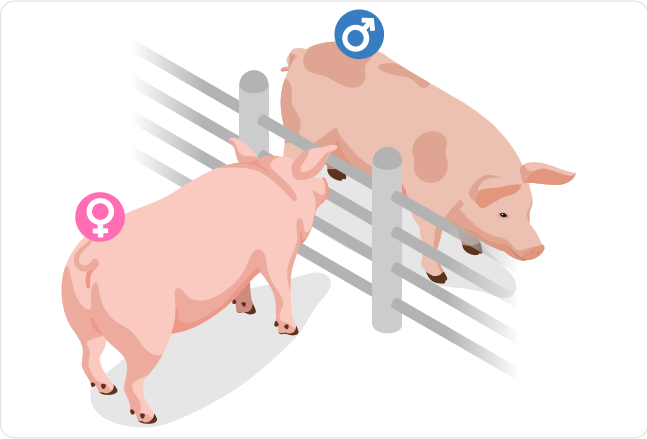
- Space allowance according to local regulations (for US: 0.33 m², 0.70 m² and 1.11 m² for <10, 10 – 20, and 21+ weeks of age, respectively).
- Remove culls and non-select as soon as possible, allowing more space and attention for select gilts.

1.2 Milestones of gilt development

Key aspects associated with optimum gilt development

Pinilla & Lecznieski (2010) ↗

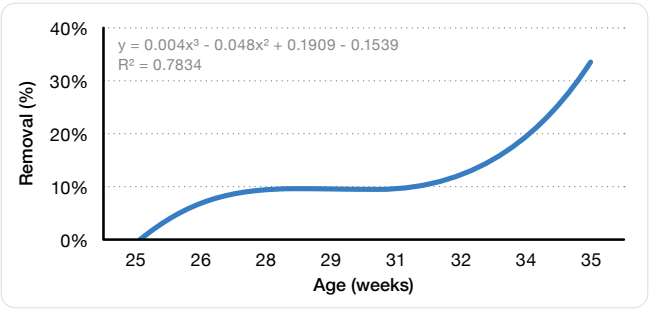
Breeding



- Boar exposure – start around 22 – 24 weeks of age.
- Daily direct boar exposure is the best way to stimulate puberty in a group of gilts.
- 85% recording estrus event within 35 days of boar exposure (puberty < 200 days).
- Record HNS (heat no service) events for breeding planning and productivity purposes.
- Target breeding in 2nd or 3rd estrus.
- Breeding weight around 140 – 150 kg at 200 – 220 days of life.
- Breeding gilts too light (< 135 kg) or too heavy (> 175 kg) might reduce their longevity in the herd (Pinilla & Lecznieski, 2010).

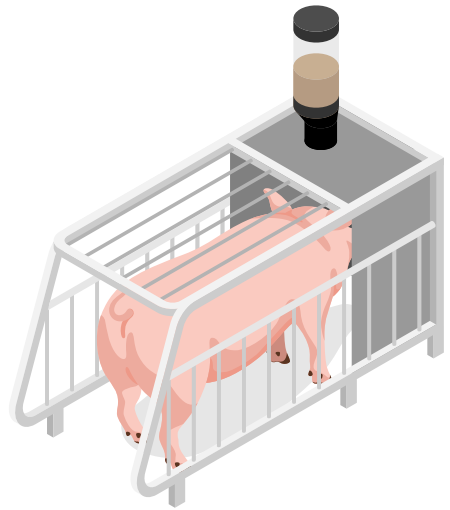
One key predictor of reproductive performance is the gilt body weight at first service. However, a limited number of producers weigh gilts. Thus, flank taping and /or gilt age are the most common methods to estimate eligibility. Pinilla & Lecznieski contrasted age at breeding versus culling rate from breeding to first weaning. The removal rate was constant in gilts first bred at 28 – 31 weeks of age. From 32 weeks of age, there was an increased culling rate *(Graph 2)*.

The authors suggested that this was a consequence of limited growth rate, limited reproductive ability, and/or too much weight gained in the gestation.



Graph 17. Removal Rate in Gilts According to Age at First Breeding (Pinilla & Lecznieski, 2010)

Management



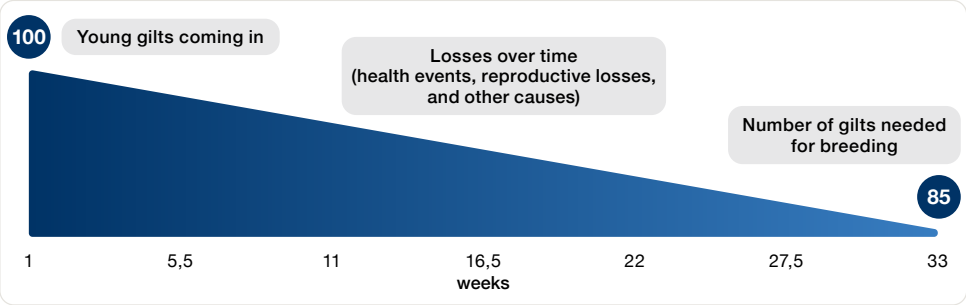
- Train gilts on feeders and waters used in gestation (at least 16 days prior to breeding). Otherwise, lack of proper ingestion can result in distress and consequently reproductive losses.

1.2.1 Gilt availability planning. A good finish requires a well prepared start.

The need for gilts is defined based on gilt survival from purchase until breeding, the selection rate, and the desired replacement rate of the breeding herd.

Thus, there is the need to:

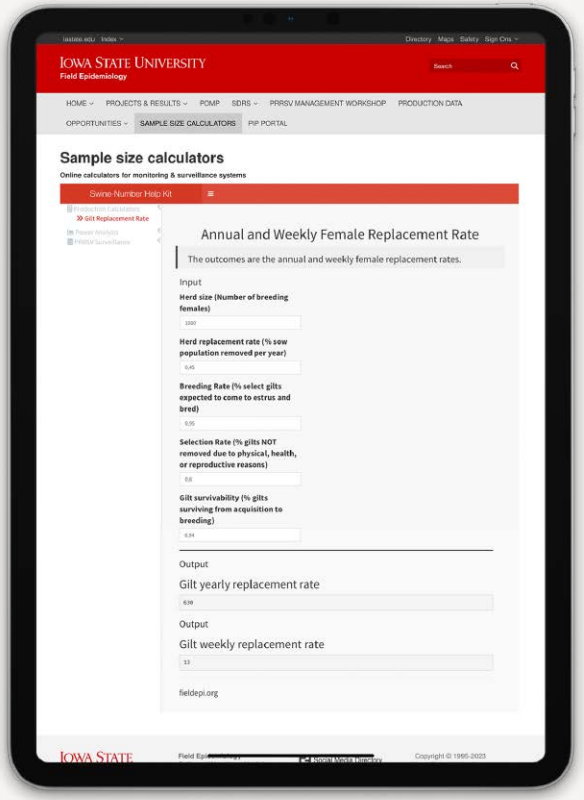
- Understand the survivability, selection rate, and retention rate from the time of acquiring gilts to breeding (e.g., 100 incoming gilts/week as weaners, 95 gilts/week reach selection at 150 days of age, 70 gilts/week are ready for breeding).



Graph 18. Gilt pool planning requires understanding of all expected losses from recruitment to breeding.

- Understand the volume of gilts needed per week to meet the herd's breeding target: A 1000 sow farm with a yearly replacement rate of 48% and 92% farrowing rate will need 10 gilts ready to be bred every week (weekly breeding target of 43 sows + 10 gilts = 53).
- Plan accordingly for gilt losses from health events, culling, and other causes, acquiring the proper number of young gilts to consistently meet the breeding target when they come to age.

Gilt replacement Calculator



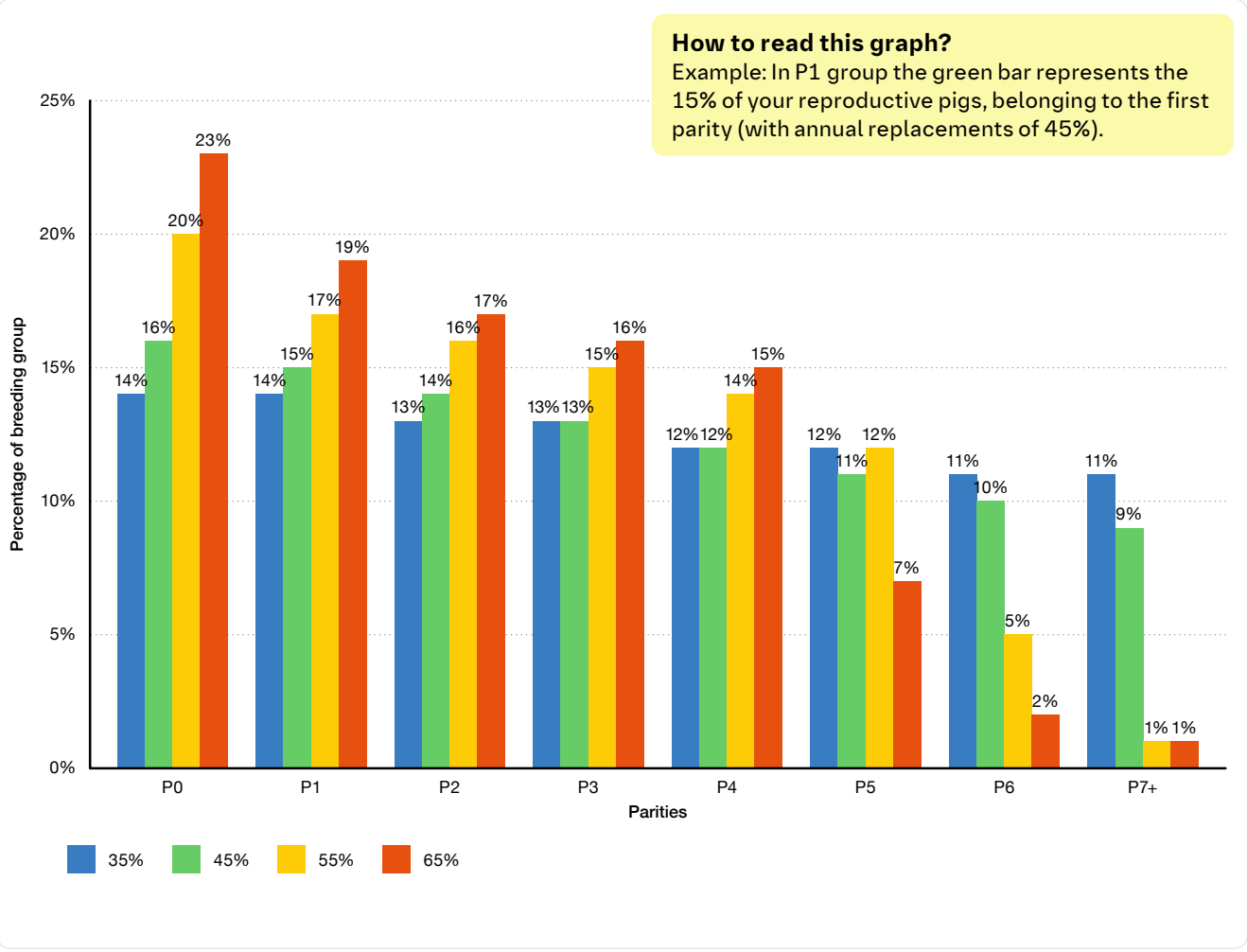
Gilt replacement Calculator ↗

1.2.1 Gilt availability planning. A good finish requires a well prepared start.

Producers should implement plans to retain sows longer in farms when planning to be more profitable in the future. The retention rate is directly impacted by the quality of gilt preparation to the recipient herd, i.e., properly developed and acclimated gilts will have a longer retention rate.

A more mature herd can optimize the production of full value piglets, and consequently finisher performance and percentage of full value pigs to market. A 45–50% annual replacement rate is proposed as a reasonable target, with an average age in the neighbourhood of 3.5 parities, and a 33% of the breeding group in the P-0 and P-1 category and more than 50% in the P-2 to P-5 group *(Graph 4)*.

Exception to those rules would be start up farms and when there is a herd closure due to disease outbreaks.



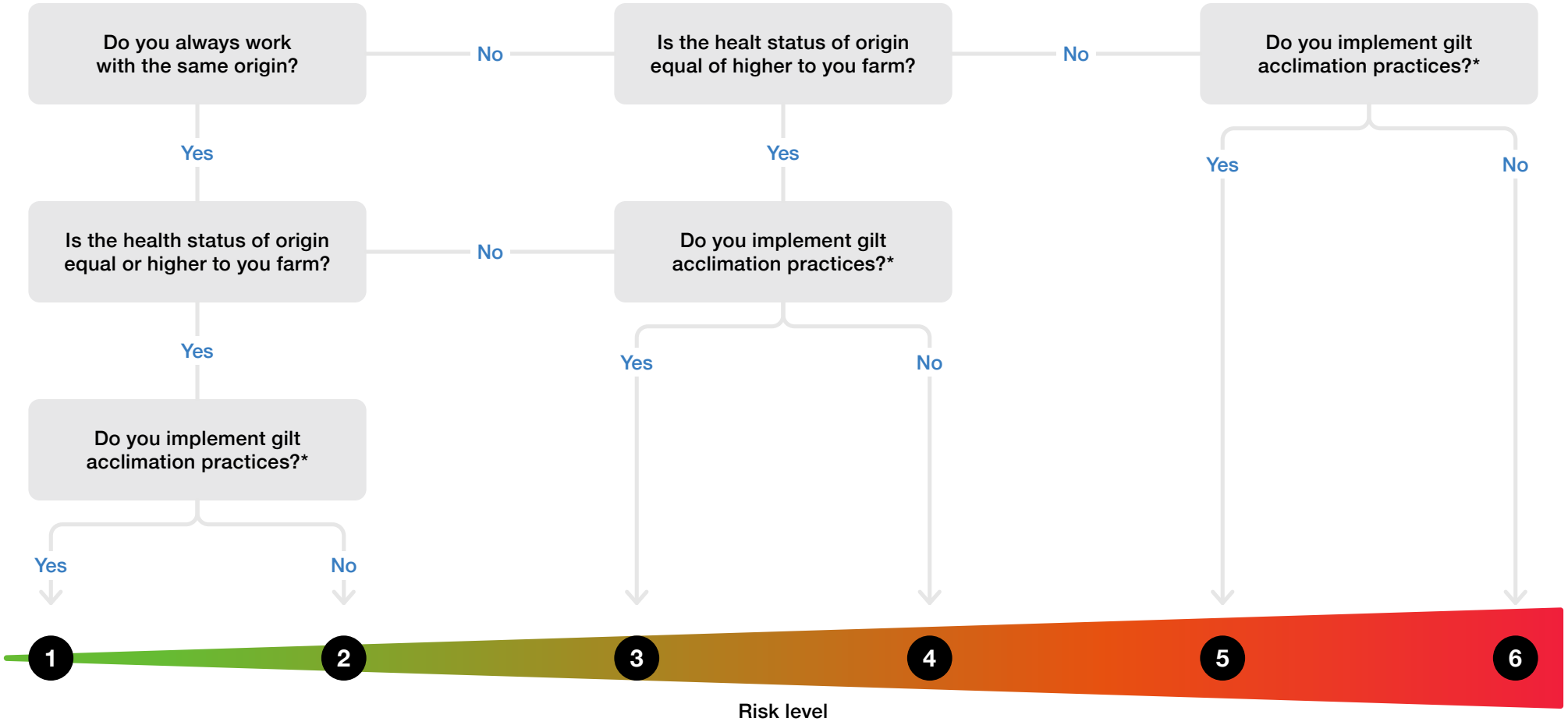
Graph 19. Breeding Groups and Annual Replacement Rate (Pinilla & Lecznieski, 2010)

Pinilla & Lecznieski (2010) ↗

1.2.1 Gilt availability planning. A good finish requires a well prepared start.

Adapted from: *Bernaerdt et al., 2021* ↗

Are breeding gilts purchased? Check your policy



***Gilt acclimation practices:** vaccination, testing, cool down period, clinical observation in quarantine*

Global PRRS Solutions

Boehringer Ingelheim

Episode: 13

Preparing gilts for breeding: Development and acclimation

—Dr. Clayton Johnson

30 min.

“It’s important that pathogen exposure occurs early enough in the gilt’s life so she recovers from the infection, stops shedding the pathogen and is immunocompetent at the time of farrowing”

Divide the young gilt’s time before breeding into the separate categories of development and acclimation, says Dr. Clayton Johnson of Carthage Veterinary Services in the U.S.A. Development aims to prepare her physiology for a future in reproduction, acclimation tries to arm her immune system to cope with the pathogens in the sow herd.

Listen now:

Listen on Google Podcasts | Listen on Apple Podcasts | LISTEN ON Spotify | WATCH ON YouTube

Episode: 14

Preparing gilts for breeding: The road to top performance

—Dr. Clayton Johnson

35 min.

“Gilts can be the best reproductive performers on the farm in terms of conception rates and farrowing rates – if they are not the best, there’s an opportunity there for us to go work on”

For larger sow systems, a group-based gilt preparation process from weaning at 6 kilograms to breeding at 135 kg is detailed in this conversation in the United States with Dr. Clayton Johnson, veterinarian partner and Director of Health at Carthage Veterinary Services. Health acclimation should begin as early as possible, he tells us.

Listen now:

Listen on Google Podcasts | Listen on Apple Podcasts | LISTEN ON Spotify | WATCH ON YouTube

1.3 Gilt Introduction: The Concept of Single and Double 12

- Gilts should be in a biosecure facility (i.e., quarantine), avoiding unexpected infections before introduction to sow farms, to avoid the disease outbreaks in sows and offspring.
- Relying solely on natural immunization does not result in even (homogeneous) and consistent immunity.
- If the gilts are housed in a continuous flow system before entering the sow herd, they can carry PRRS virus from recently placed animals to the sow breeding unit.

Therefore:

- ✓ **Ideally introduce gilts after clinical and diagnostic monitoring in a quarantine.**
- ✓ **The quarantine should be run as one single all in/all out at least by room; if possible by barn, to break infection chains.**

This can be handled in different ways. We present some practical examples of isolation and acclimatisation of gilts.

What is the definition of a gilt quarantine or isolation?

- ✓ It is a room or compartment that is **separated from the rest of the herd.** The separation should be physical, meaning a different airspace than the rest of the herd, and also with limited epidemiological connections with the breeding herd. For instance, shared labor should be avoided between the breeding herd and the isolation unit.
- ✓ It has a **separate entrance, separate ventilation** and **manure handling.**
- ✓ The room can serve as **quarantine and acclimation at the same time.**

On the upcoming pages you will learn about a few different concepts of how to introduce new gilts into your herd.

These concepts are:

- **The Concept of Single 12** – One Isolation/Acclimation barn, run as all in all out and closed for 12 weeks.
- **The Concept of Double 12** – Two Isolation/Acclimation barns, run as all in all out and closed for 12 weeks.
- **The Concept of 2X6** – An adaptation of "Single or Double 12" for smaller batches, keeping the 12 weeks Isolation period.
- **The Concept of 4X4** – An adaptation of "Single or Double 12" for even smaller batches, keeping the 12 weeks Isolation period.
- **The Concept of Introducing Iso Gilts** – An Adaptation of "Single/Double 12" starting Isolation with 4 weeks of age, while using an Isolation barn and a gilt development barn.

Watch the video on "The concept of Single and Double 12".

— by Poul Rathkjen, Swine Veterinarian

1.3 Gilt Introduction: The Concept of Single 12

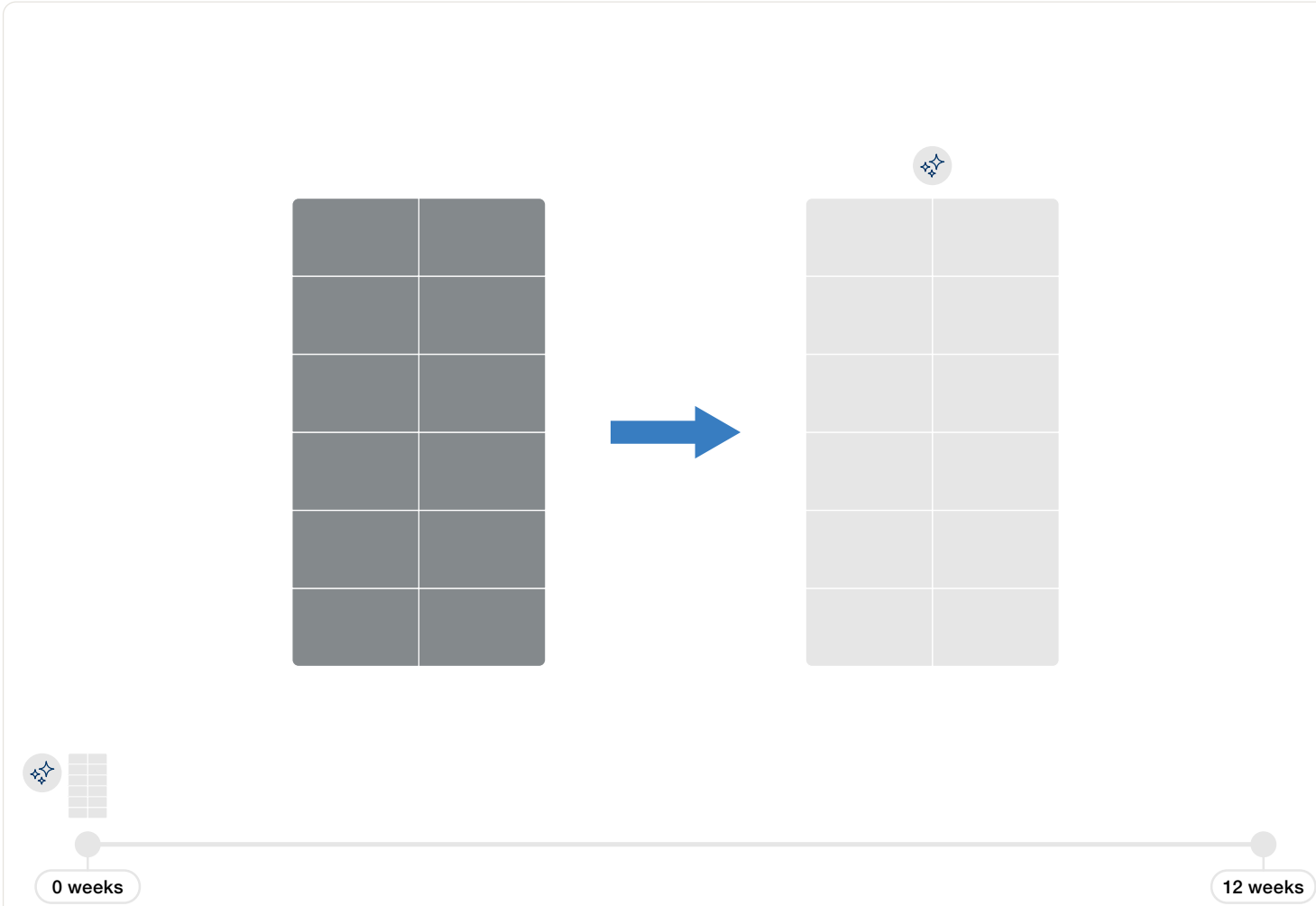
One Isolation/Acclimation barn, run as all in all out and closed for 12 weeks

Watch the explanatory video about **"The Concept of Single 12"**

Step 1: Start out with an empty, cleaned and disinfected room

Preparation

- The room is thoroughly cleaned and disinfected before each batch of gilts.
- All gilts are moved to the quarantine on the same day.



Global PRRS Solutions

Boehringer Ingelheim

1.3 Gilt Introduction: The Concept of Single 12

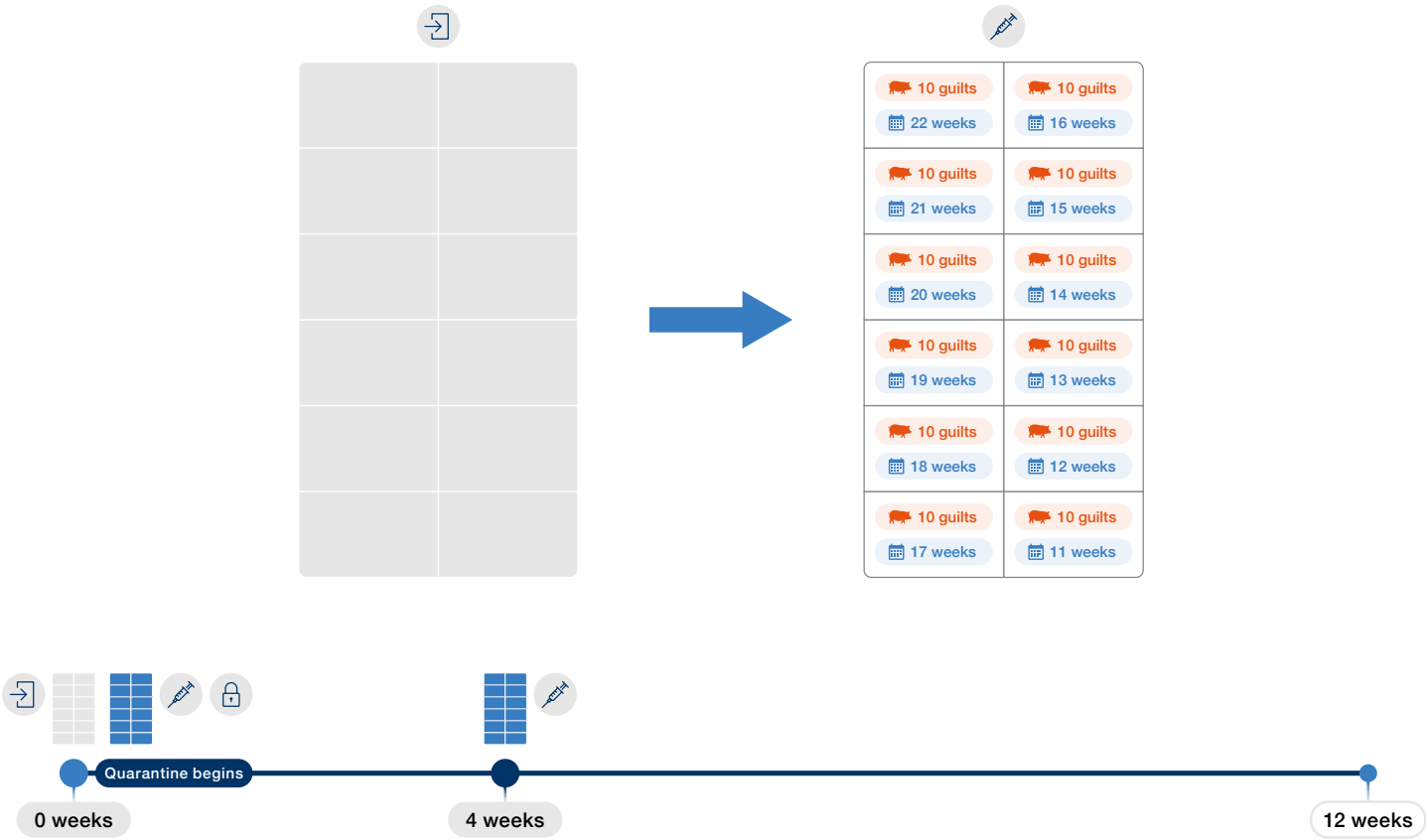
One Isolation/Acclimation barn, run as all in all out and closed for 12 weeks

Watch the explanatory video about **"The Concept of Single 12"**

Step 2: The gilt quarantine is filled at the same day

- One acclimation compartment is **filled at the same time.**
- The age of the gilts is between **11 and 22 weeks.**
- **All gilts are vaccinated against all relevant pathogens** directly after placement.
- In non-naïve herds: The PRRS vaccination of all gilts are **repeated 4 weeks later.**
- The compartment is **closed for 12 weeks.**

Note: No feedback material for natural exposure should be used in gilts.



Global PRRS Solutions

Boehringer Ingelheim

1.3 Gilt Introduction: The Concept of Single 12

One Isolation/Acclimation barn, run as all in all out and closed for 12 weeks

Watch the explanatory video about **"The Concept of Single 12"**

Step 3: The gilt are acclimated and ready for moving to the sow site

- After 12 weeks of quarantine, **all the gilts are moved to the sow site** and the **oldest gilts are ready to be inseminated.**

Once empty, cleaned and disinfected the room is ready for next batch of gilts.

Global PRRS Solutions

Boehringer Ingelheim

1.3 Gilt Introduction: The Concept of Double 12

Two Isolation/Acclimation barns, run as all in all out and closed for 12 weeks

Watch the explanatory video about **"The Concept of Double 12"**

The Quarantine **can be run as a double 12,** which **requires an additional room.** These two rooms run 12 weeks apart. This saves a lot of space in the sow site as **gilts can be moved week by week.**

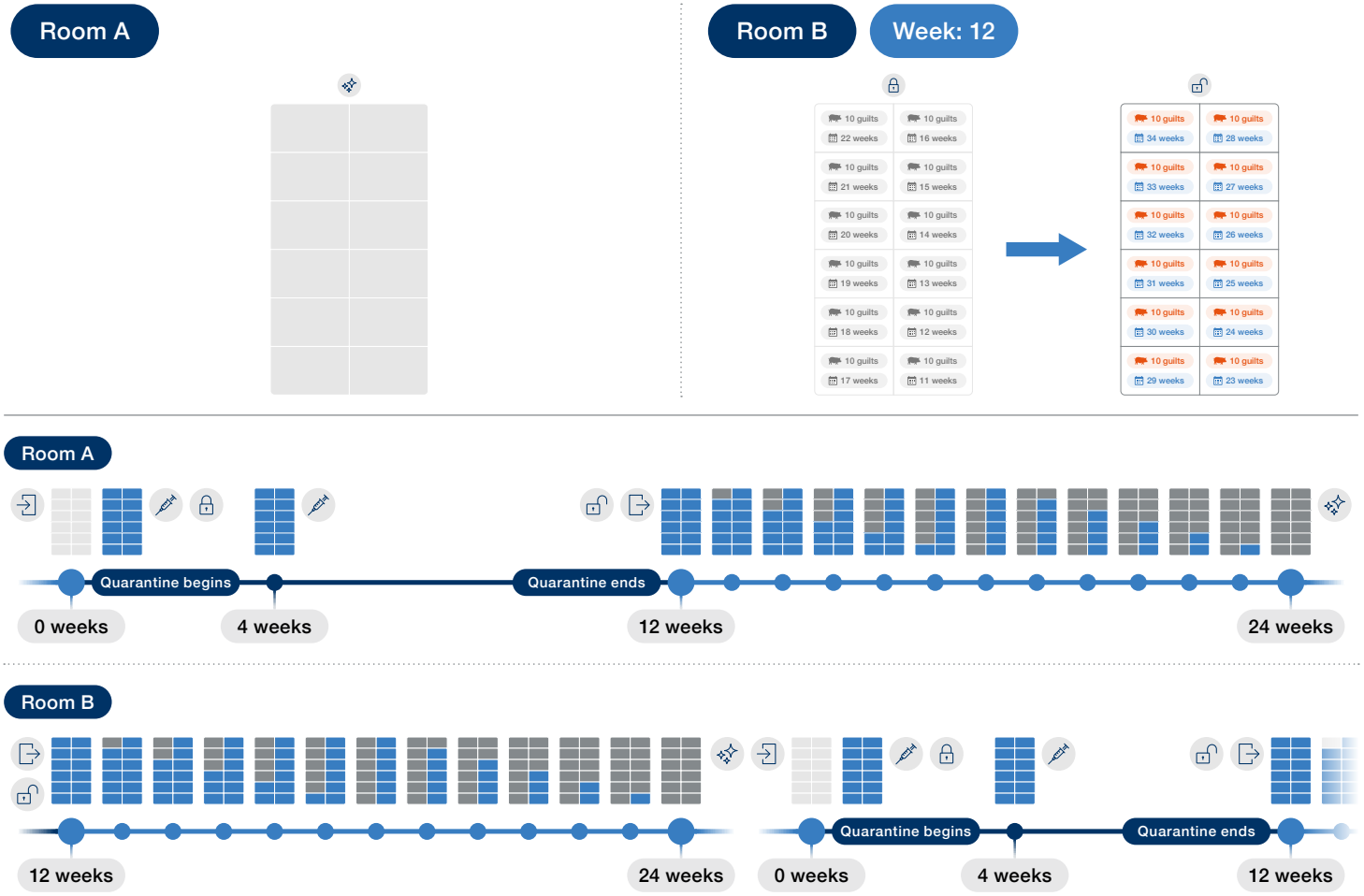
Room A

Preparation

- The room is thoroughly cleaned and disinfected before each batch of gilts.
- All gilts are moved to the quarantine on the same day.

Room B

- After 12 weeks of quarantine, the gilts can be **moved pen by pen to the sow site** and **are ready to be inseminated.**



Global PRRS Solutions

Boehringer Ingelheim

1.3 Gilt Introduction: The Concept of Double 12

Two Isolation/Acclimation barns, run as all in all out and closed for 12 weeks

Watch the explanatory video about **"The Concept of Double 12"**

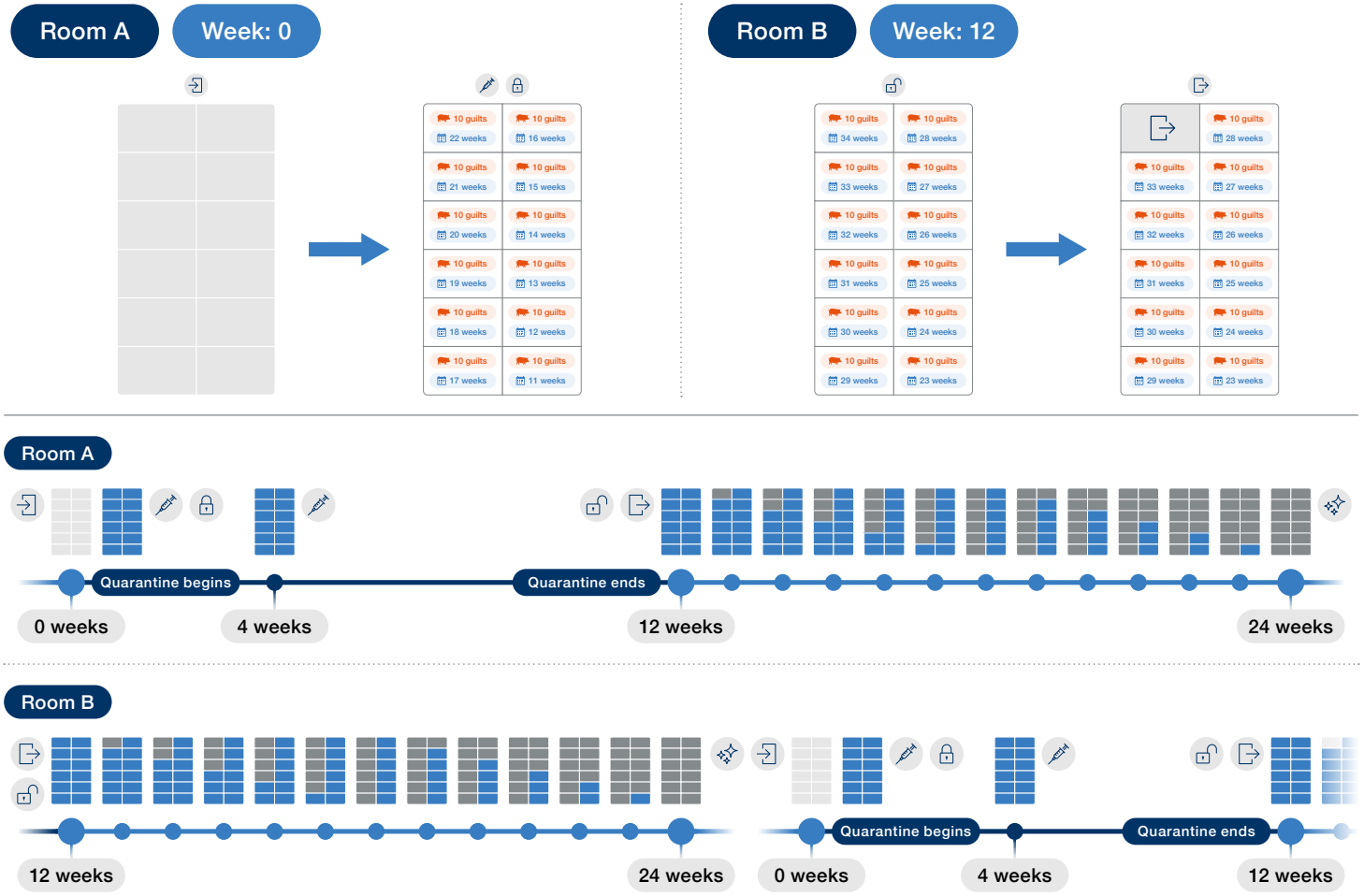
Room A

- One acclimation compartment is **filled at the same time.**
- The age of the gilts between **11 and 22 weeks.**
- **Immediately all the gilts are vaccinated against all relevant pathogens** including PRRSv using an efficient MLV vaccine.
- The PRRS vaccination of all gilts are **repeated 4 weeks later.**
- The compartment is **closed for 12 weeks.**

Note: No feedback material for natural exposure should be shared to the gilts.

Room B

- The compartment is emptied **week by week** in the following 11 weeks.



Global PRRS Solutions

Boehringer Ingelheim

1.3 Gilt Introduction: The Concept of Double 12

Two Isolation/Acclimation barns, run as all in all out and closed for 12 weeks

Watch the explanatory video about **"The Concept of Double 12"**

Room A

- After 12 weeks of quarantine, the gilts can be **moved pen by pen to the sow site** and **are ready to be inseminated.**

Room B

- After 12 weeks, empty, cleaned and disinfected **the room is ready to be filled again.**

Global PRRS Solutions

Boehringer Ingelheim

1.3 Gilt Introduction: The Concept of 2X6

An Adaptation of “Single or Double 12” for smaller batches, keeping the 12 weeks Isolation period

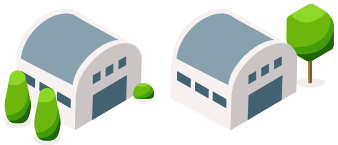
Watch the explanatory video about **"The Concept of 2X6"**

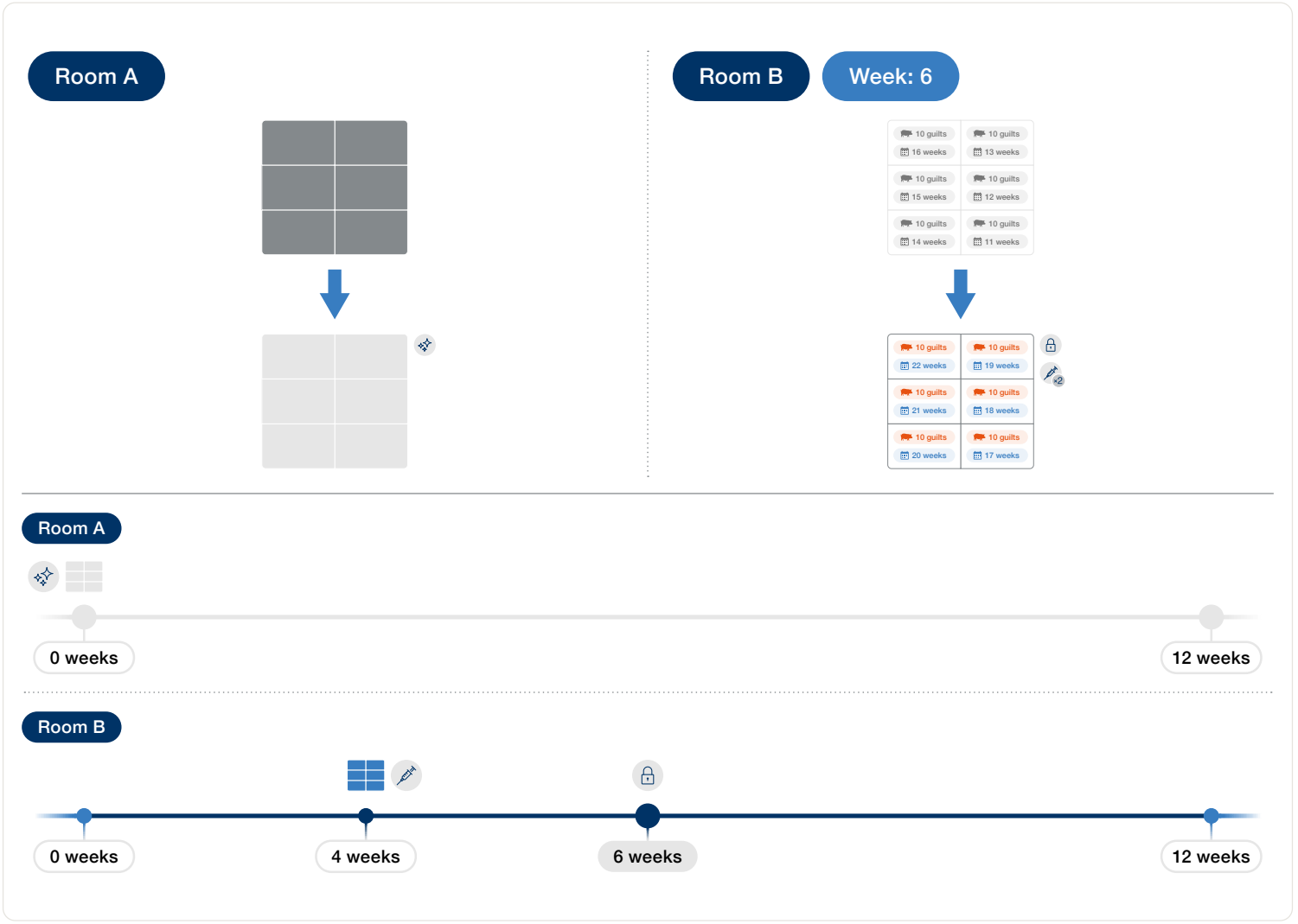
My rooms are too small for single or double 12. What should I do?

In case only smaller rooms are available, **it is still important to keep the 12 week quarantine period.** One solution could be to **purchase gilts every 6 weeks** and place them in small **all in all out rooms** containing 6 week batches. This **reduce the age variation** of the purchased/placed gilts and **less demand of space** in the sow site.

Preparation

- The rooms are thoroughly cleaned and disinfected before each batch of gilts.
- All gilts are moved to the quarantine at the same day.





Global PRRS Solutions

Boehringer Ingelheim

1.3 Gilt Introduction: The Concept of 2X6

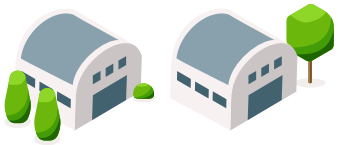
An Adaptation of "Single or Double 12" for smaller batches, keeping the 12 weeks Isolation period

Watch the explanatory video about **"The Concept of 2X6"**

Quarantine

- One acclimation compartment is **filled at the same time.**
- The age of the gilts between **11 and 16 weeks.**
- **Immediately all the gilts are vaccinated against all relevant pathogens** including PRRSv using an efficient MLV vaccine.
- The PRRS vaccination of all gilts are **repeated 4 weeks later.**
- The compartment is **closed for 12 weeks.**

Note: No feedback material for natural exposure should be shared to the gilts.



Global PRRS Solutions

Boehringer Ingelheim

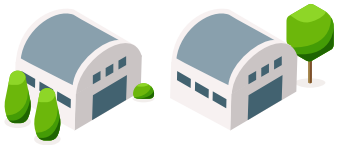
1.3 Gilt Introduction: The Concept of 2X6

An Adaptation of “Single or Double 12” for smaller batches, keeping the 12 weeks Isolation period

Watch the explanatory video about **"The Concept of 2X6"**

Conclusion

- After 12 weeks of quarantine, the gilts can be **moved pen by pen to the sow site** and **are ready to be inseminated.**



Global PRRS Solutions

Boehringer Ingelheim

1.3 Gilt Introduction: The Concept of 4X4

An Adaptation of "Single or Double 12" for even smaller batches, keeping the 12 weeks Isolation period

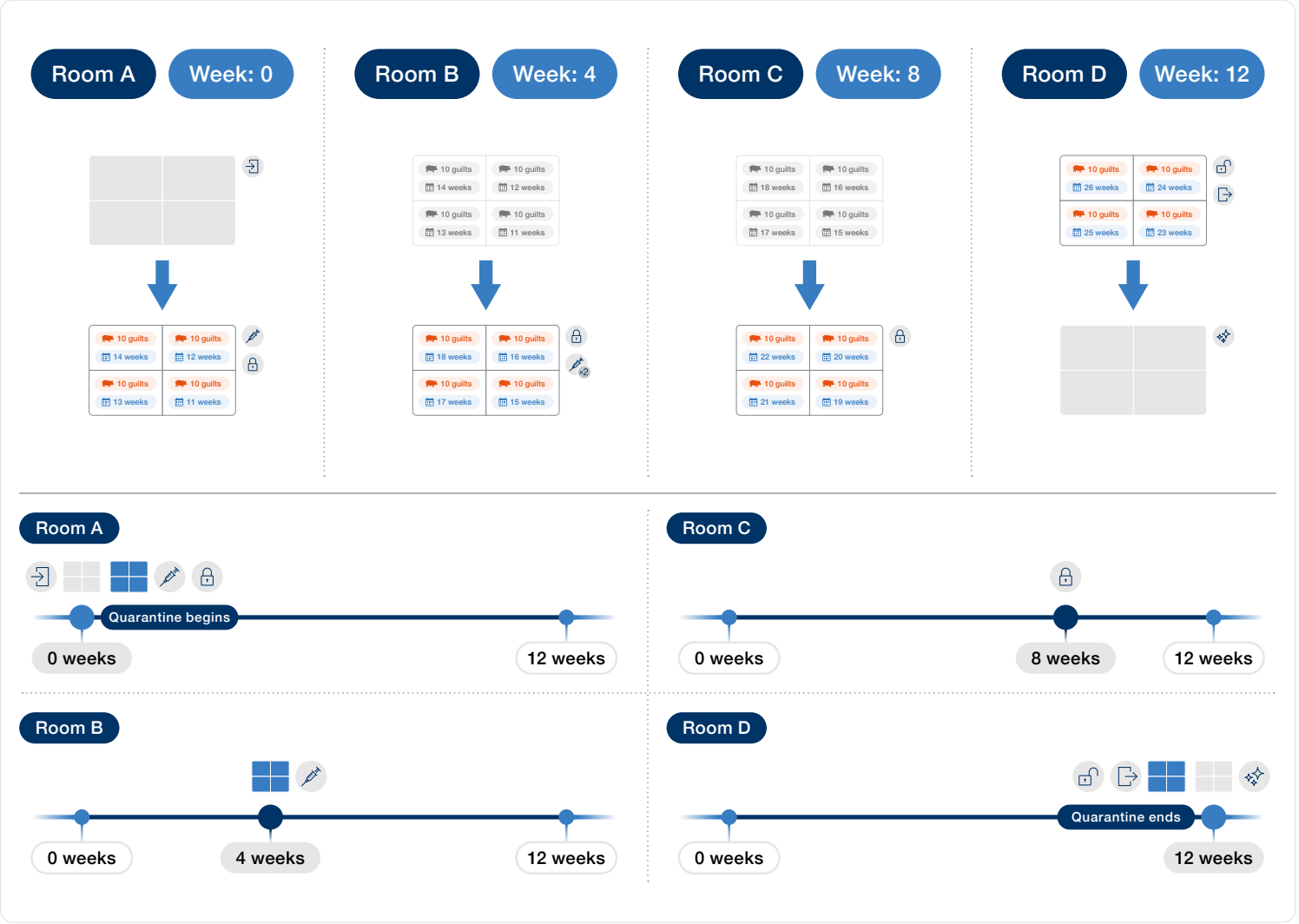
Watch the explanatory video about **"The Concept of 4X4"**

My rooms are too small for single or double 12. What should I do?

In case only smaller rooms are available, **it is still important to keep the 12 week quarantine period.** One solution could be to **purchase gilts every 6 weeks** and place them in small **all in all out rooms** containing 6 week batches. This **reduce the age variation** of the purchased/placed gilts and **less demand of space** in the sow site.

Preparation

- The rooms are thoroughly cleaned and disinfected before each batch of gilts.
- All gilts are moved to the quarantine at the same day.



Global PRRS Solutions

Boehringer Ingelheim

1.3 Gilt Introduction: The Concept of 4X4

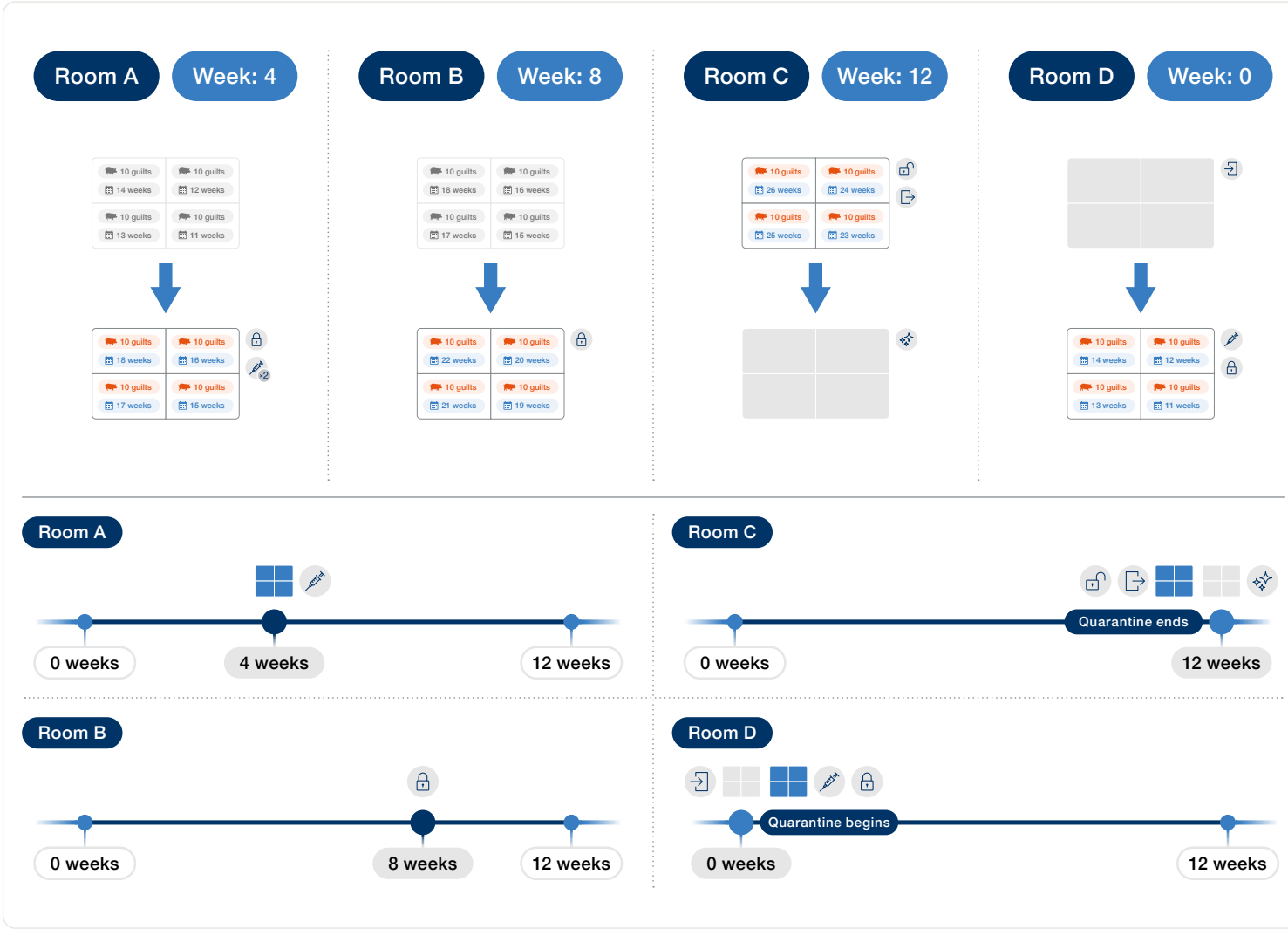
An Adaptation of "Single or Double 12" for even smaller batches, keeping the 12 weeks Isolation period

Watch the explanatory video about **"The Concept of 4X4"**

Quarantine

- One acclimation compartment is **filled at the same time.**
- The age of the gilts between **11 and 14 weeks.**
- **Immediately all the gilts are vaccinated against all relevant pathogens** including PRRSv using an efficient MLV vaccine.
- The PRRS vaccination of all gilts are **repeated 4 weeks later.**
- The compartment is **closed for 12 weeks.**

Note: No feedback material for natural exposure should be shared to the gilts.



Global PRRS Solutions

Boehringer Ingelheim

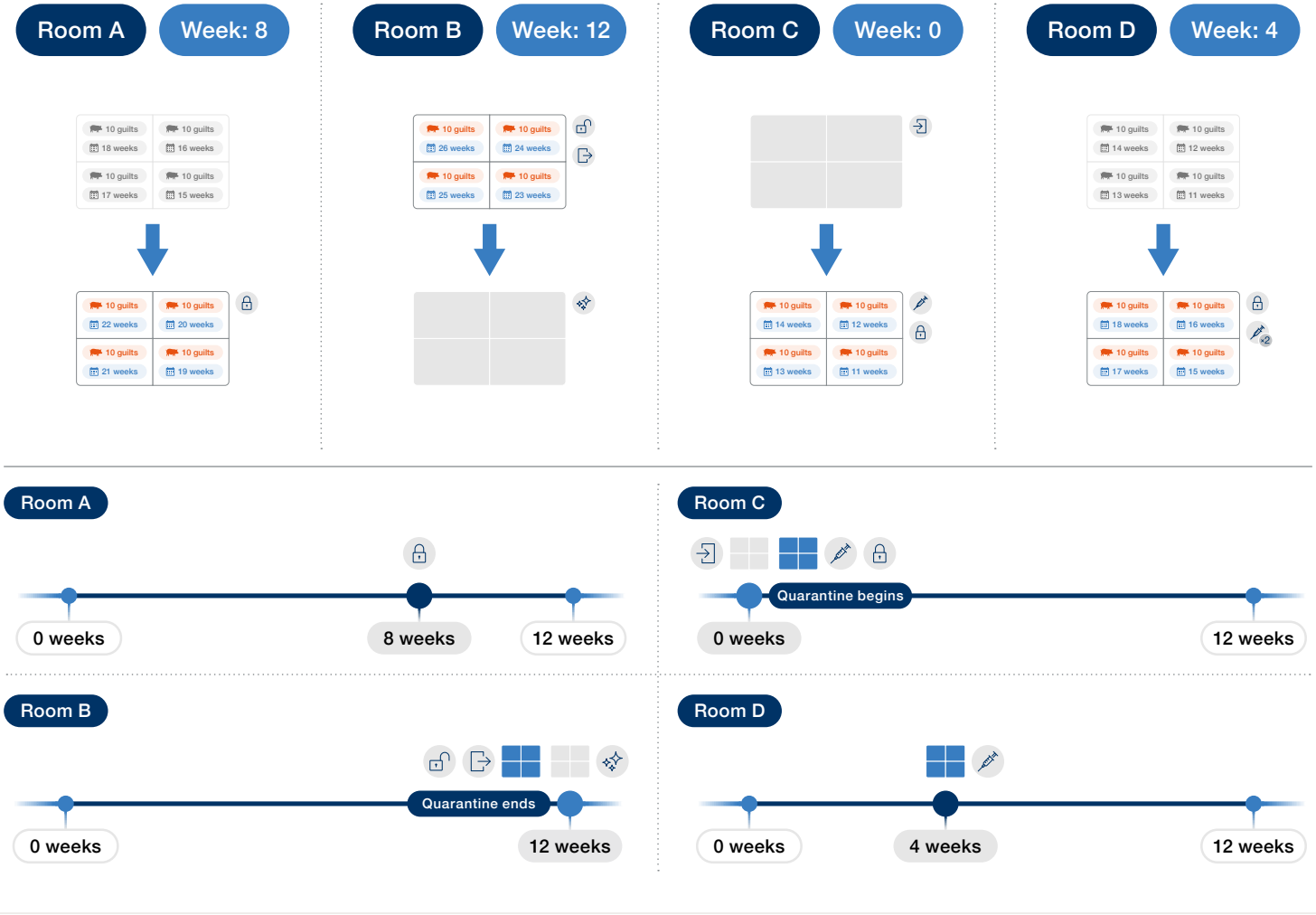
1.3 Gilt Introduction: The Concept of 4X4

An Adaptation of “Single or Double 12” for even smaller batches, keeping the 12 weeks Isolation period

Watch the explanatory video about **"The Concept of 4X4"**

Conclusion

- After 12 weeks of quarantine, the gilts can be **moved pen by pen to the sow site** and **are ready to be inseminated.**



Global PRRS Solutions

Boehringer Ingelheim

Gilt Introduction: The Concept of Introducing Iso Gilts

Adaptation of “Single/Double 12” starting Isolation with 4 weeks of age

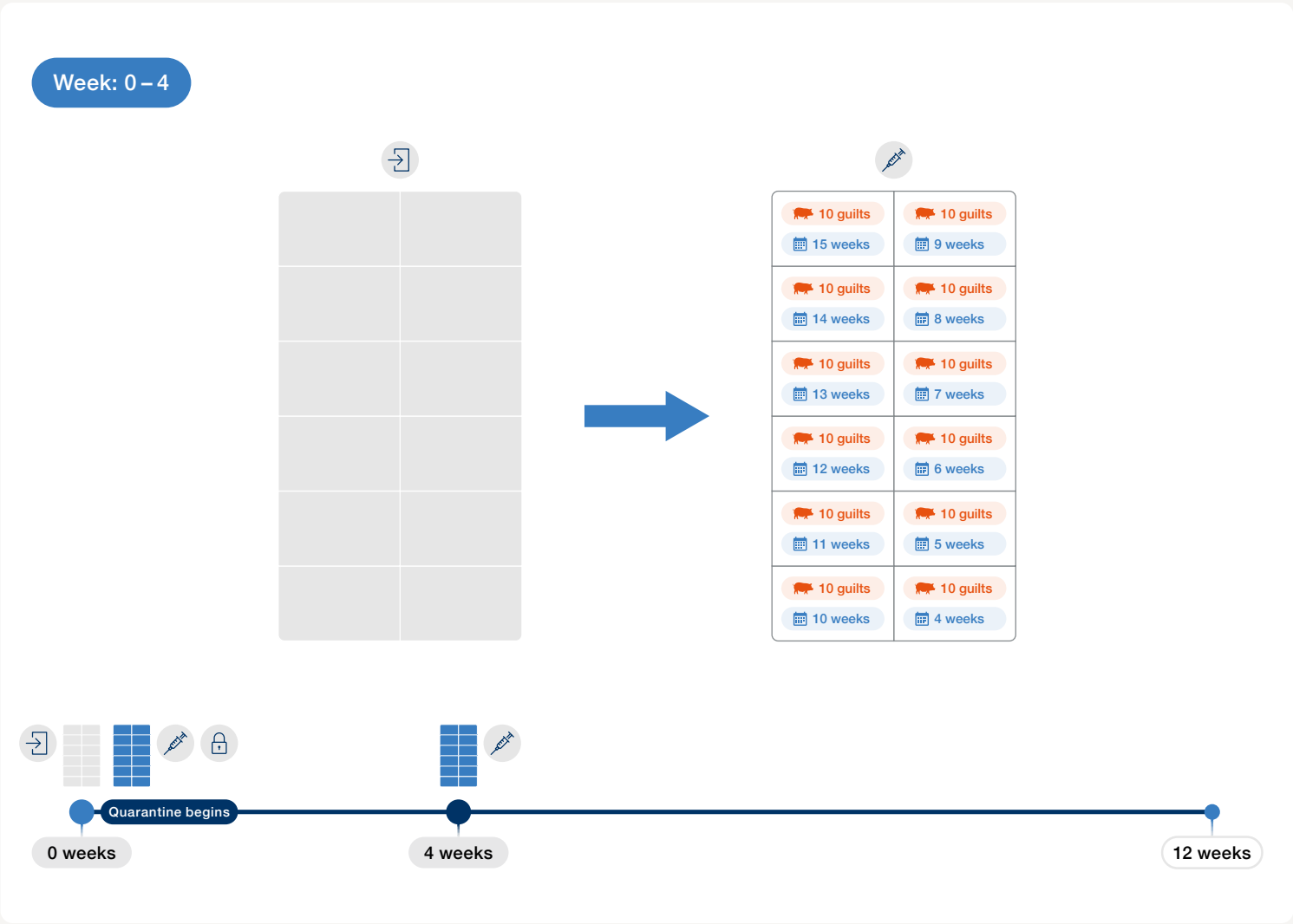
My gilts are too young? What should I do?

The only age limitation for gilt introduction is the weaning age. In this example this barn was filled with gilts starting with **4 week of age, going up to 15 weeks of age.**

The main concept remains the same, meaning allowing the gilts to isolate and acclimate for **12 weeks** before introduction into GDU. If you do not have sufficient room capacity, see the previous section on how to adapt the concept to smaller rooms.

- One acclimation compartment is **filled at the same time.**
- The age of the gilts is between **4 and 15 weeks.**
- **All gilts are vaccinated against all relevant pathogens** directly after placement.
- In non-naïve herds: The PRRS vaccination of all gilts are **repeated 4 weeks later.**
- The compartment is **closed for 12 weeks.**

Note: No feedback material for natural exposure should be used in gilts.



Global PRRS Solutions

Boehringer Ingelheim

Gilt Introduction: The Concept of Introducing Iso Gilts

Using an Isolation barn and a gilt development barn

Management in a farm receiving replacement gilts with 3 – 4 weeks old, working with an isolation barn and a gilt development unit in continuous flow.

Some farms manage their gilt replacement receiving younger gilts. These gilts come from an external source (not internal replacement) just after weaning, around 3 – 4 weeks old. They stay at the isolation/quarantine barn for 4 weeks, until the diagnostics results are available, and then enter the gilt development unit (GDU).

The difference to the previous concept is a shorter Isolation/Quarantine (4 instead of 8 weeks).

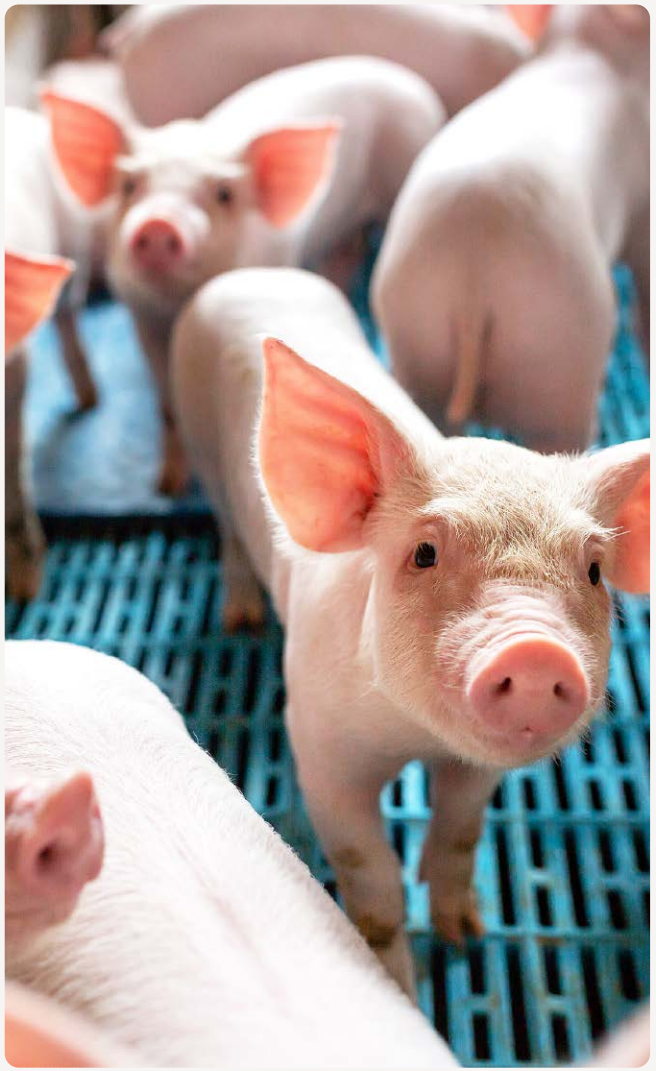
Pros and Cons

Pros:

- Vaccination protocol may start at isolation barn where gilts receive the first immunization dose.
- Gilts enter the farm from isolation at 8 weeks old and have 16 weeks of acclimation before artificial insemination. This should be enough time for them to be exposed and acclimated to the farm endemic pathogens.

Cons:

- Gilts will have a shorter isolation period (4 weeks) and might be shedding pathogens when entering the GDU.
- Gilts will require special care during isolation as they are just weaned. The isolation barn should work as a nursery, with good ventilation and temperature management as well as providing enough water and feed sources.
- Compared to the model receiving gilts with 11 – 12 weeks of age, in this model the farm needs to consider the additional losses due to mortality from 3 – 4 to 11 weeks of age.



Gilt Introduction: The Concept of Introducing Iso Gilts

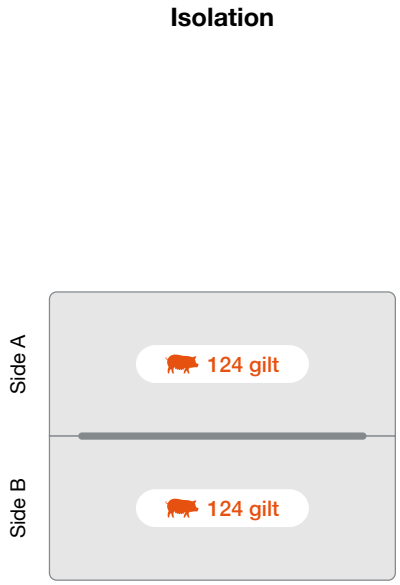
Using an Isolation barn and a gilt development barn

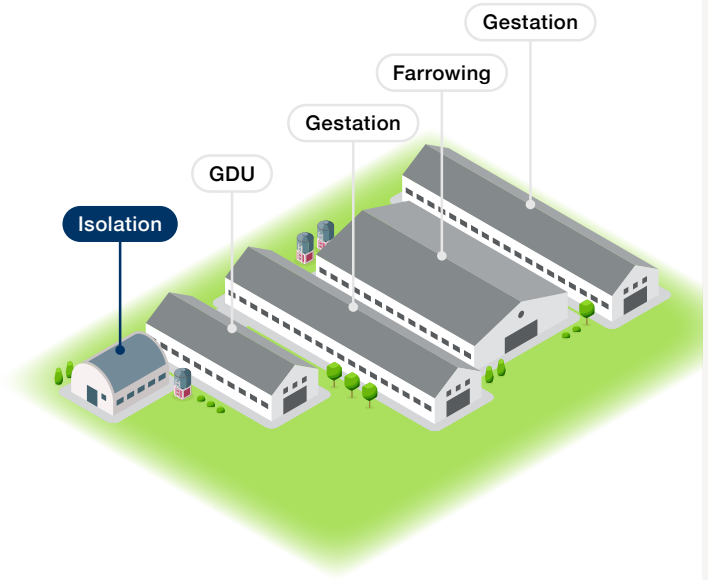
How would this concept be applied in a 4.800 sows farm with a replacement rate of 45%?

For such a farm 41 gilts are needed, ready to be bred, on weekly basis. Considering a wean-to-selection mortality of 6%, a selection rate of 70% and a 4 weeks isolation period, we´ll need to enter 248 gilts every month into the isolation facility.

These gilts will stay in isolation for 4 weeks, until they are confirm negative for the major pathogens. During this period, the isolation facility is structured like a nursery.

After 4 weeks the gilts are released and the group is moved to the GDU. The isolation will then be cleaned, disinfected and prepared to receive a new batch of gilts.





*Example farm:
4800 sows – 45% replacement rate

Gilt Introduction: The Concept of Introducing Iso Gilts

Using an Isolation barn and a gilt development barn

Step 1

- Gilts coming from isolation

Step 2

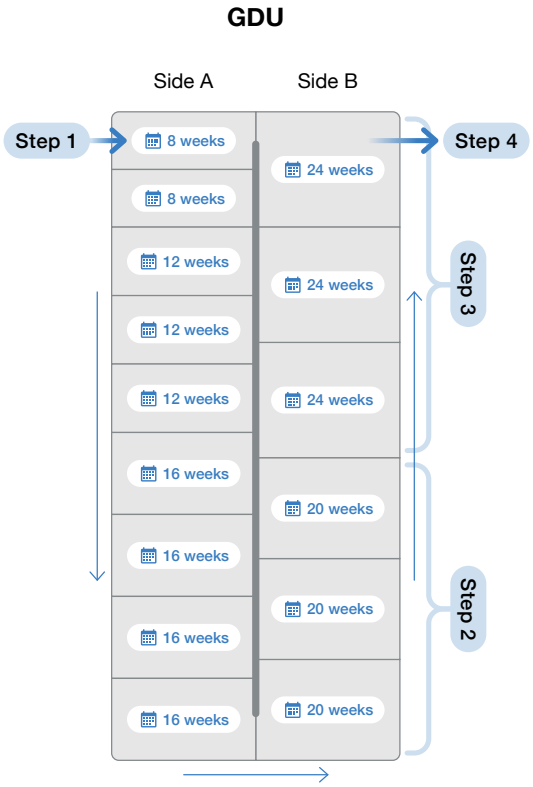
- Proceed the gilt Selection at 20 weeks.
- Remove all non-selected gilts, allowing more space (m^2) for the selected ones.
- Selection target should be 70 – 75%.

Step 3

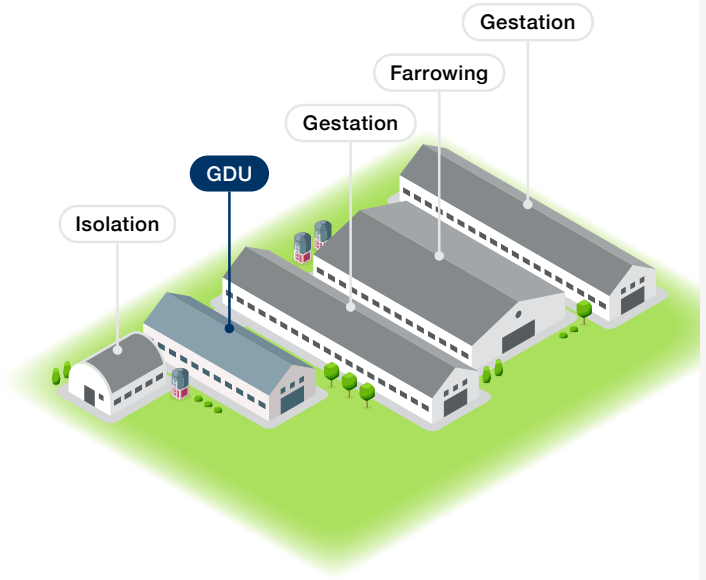
- When gilts are moved to the last stage in GDU, start boar exposure/estrus stimulation.

Step 4

- Gilts are moved to the flushing area (at gestation barn) after the detection of first estrus.



*Example farm:
4800 sows – 45% replacement rate



Global PRRS Solutions

Boehringer Ingelheim

1.4 Gilt Isolation

To understand if you are getting the full benefit of your gilt acclimation program follow these 3 easy steps.

Start with the **1st step** – diagnostic check up to verify, (a) your newly introduced animals don't carry specific pathogens and (b) have enough time to acclimate their immune status according to your sow farm status.

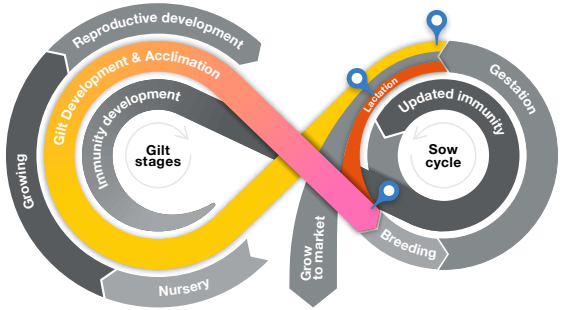
As **2nd step**, implement actions based on the outcome of the diagnostic results, whereas the **3rd step** includes vaccination guidelines for proper immunization of your most precious pigs on your farm, your gilts.

1.4 Gilt Isolation

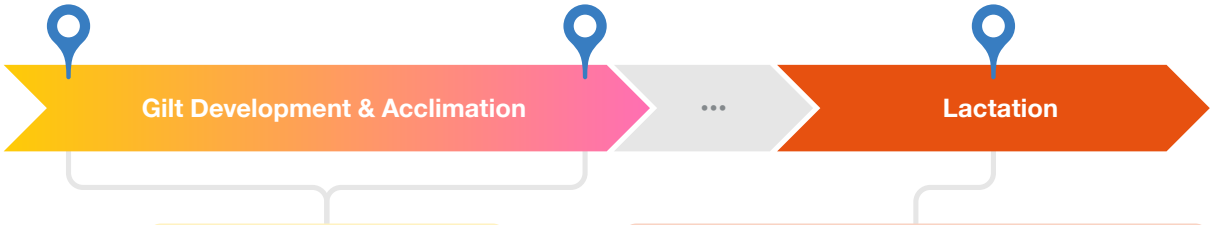
Step 1: Diagnostic checkpoints & general sampling recommendations.

Simply put, gilt acclimation means building immunity to targeted pathogens (e.g., PRRSv, PCV2, PPV, Mhp).

To measure the effectivity of acclimation procedures, pathogen-specific monitoring is necessary to ensure exposure and, later on, to seek evidence of protective immunity development.



Sampling recommendations



See the next page table for more details

→ Tongue tip fluids (TTF) from stillborn
assesing vertical transmission

→ Processing fluids (PF) or (TTF) from ≤ 1 week old piglets
PRRSv activity in newborns

→ Family oral fluids (FOF) from weaning-age piglets
PRRSv activity at weaning

- Collect samples from Parity 1 offspring, and from P3+
- Compare PCR positivity and Ct values between P1 Vs P3+
  - If similar, gilt acclimation is likely okay.
  - If PCR positivity is ≥ 20% higher, or Ct value ≤ 20% lower in P1 compared to P3+ there is a sign of instability in gilts.

1.4 Gilt Isolation

Step 1: Diagnostic checkpoints & general sampling recommendations.

Table 9. Testing protocol for health assurance – How many samples should I take?

Prevalence	Pathogen target				
	PRRSv		*M. hyopneumoniae*		
	Serum PCR	Oral fluids PCR	Serum ELISA	Tracheal swab PCR	Oral fluids PCR
30%	9	12% pens	11	10	33% pens
20%	14	25% pens	18	15	50% pens
10%	29	66% pens	36	30	75% pens
5%	59	75% pens	73	62	All pens
3%	99	All pens	122	103	All pens

Sample size requirement for selected targets.

Cannon et al., 1982 ↗ | *Rotolo et al., 2017* ↗ | *Clavijo et al., 2021* ↗

Considerations for individual sample types:
The provided sample sizes are calculated per air space, e.g., group of pens within different rooms taken care by the same caregiver. When there are sub-populations the sample size needs to be calculated for each one. For instance, if there are multiple barns within a site, each barn is an air space, and sample size should be calculated for each one. Pooling serum and tracheal samples for PCR up to 1:20 and 1:10 respectively is appropriate when the sampling frequency is weekly or biweekly. We are not aware of data to justify pooling samples for ELISA testing.

Considerations for oral fluids testing:
When the number of total pens available in GDU's is below 20, our recommendation is to hang a rope in all pens. The sample sizes guidelines in the table are for large gilt populations with several pens. We recommend sampling as many pens as possible to maximize the coverage of the whole gilt population being monitored. Pooling is appropriate for up to 10 ropes when the testing is done frequently (weekly or bi-weekly). The probability of PRRSv detection by PCR is higher when pooling all pens from the GDU compared to testing a non-pooled subset of pens.

There will be pathogen-specific examples in the subsequent chapters. In general terms, here are some rule of thumb strategies for pathogen activity monitoring:

- **Oral fluids testing:** a good proxy of shedding & transmission potential. Oral fluids can be tested for pathogen nucleic acid (DNA or RNA) for most pathogens, and for antibodies against most pathogens. Oral fluids can be used in pigs of any age group.
- **Serum sample:** measures viremia and systemic infection, when tested by PCR (DNA or RNA) for pathogens such as PRRSv, PCV2, and PPV. Can also be tested for antibodies against all major pathogens of interest.
- **Nasal wipes or swabs:** measures shedding of respiratory pathogens including IAV, Mhp, PRRSv, and PCV2.
- **Rectal swabs:** measures shedding of enteric pathogens including PEDV, PDCoV, and Salmonella.
- **Deep tracheal swabs:** measures shedding of respiratory pathogens. It has been particularly used for Mhp.

Implications of prolonged persistence of Mhp in gilts

A recent publication has shown that Mhp persists in gilts longer than 240 days and this is impacting the gilt introduction/isolation

Table 10. Detection of *Mycoplasma hypneumoniae* genetic material in females at off-site GDU and sow farm.

Days post herd closure	Diagnostic data		
	DNA detection[1] in deep tracheal secretions # positive / # tested (%); mean Ct value (SEM)		
	Exposure location (facilities)		
	Off-site GDU*	Sow farm	Both facilities
30	67/69 (97%) 26.4 (0.6)	13/70 (19%) 33.1 (1.4)	80/139 (58%) 27.5 (0.6)
60	66/70 (94%) 27.9 (0.7)	5/70 (7%) 34.4 (3)	71/140 (51%) 28.3 (0.7)
120	60/67 (90%) 31.1 (0.6)	10/67 (15%) 36.0 (0.8)	70/134 (52%) 32.8 (0.6)
180	19/64 (30%) 35.8 (0.8)	6/65 (9%) 38 (1.2)	25/129 (19%) 36.4 (0.7)
240	2/63 (3%) 36.3 (2.4)	0/63 (0%) No positive samples	2/126 (2%) 26.3 (2.3)

**GDU: Gilt development unit. | [1] Real-time PCR: Samples with Ct values < 40 were considered positive.*

Sound as a diagnostic sample

SoundTalks® is a cloud-based sound sensor technology that provides a Respiratory Health Status (ReHS) metric (ranging from 0 – 100). Based on several peer reviewed research studies and years of sound-data in commercial facilities, ReHS has been well demonstrated to be the swine industry gold standard for the continuous objective evaluation of respiratory clinical signs.

Sound monitoring has the advantages over other health monitoring approaches of being ubiquitous, non-invasive, continuous and real-time. The core algorithm is able to measure with high sensitivity and specificity the pig-origin indicators of clinical respiratory disease. Once the data is collected by the microphones at the farm, this information is processed with Artificial Intelligence, presented by a cell phone application and LED “green-yellow-red” alert system which helps direct a more localized focus and targeted intervention.

As a result, the system supports the caregivers with early clinical indications at a zone-airspace-barn-site level, but also supports the veterinarian and production manager at a flow-system level.

How to sample my incoming animals for ASF?

Table 11. Sample size requirement for ASF per airspace early detection using individual samples.

Prevalence (Dx Se= 95%)	Pathogen target	
	ASF	
	Serum PCR*	Serum ELISA**
3%	102	102
5%	61	61
8%	38	38

**Assume airspace = 2000 animals. Individual animal testing must be taken per airspace.*
***Assuming exposure occurred 14 – 21 days prior.*

Rotolo et al., 2017 ↗

Table 12. The percentage of pens needed to be sampled to achieve 95% probability of detection assuming diagnostic sensitivity of 95% and disease prevalence levels of 3%, 5% and 8%.

Number of Airspaces	Percentage of pens to sample/air-space		
	3% prevalence	5% prevalence	8% prevalence
1	100	100	75
2	95	53	39
3	75	42	31
4	56	32	22
5	47	28	19
6	42	22	17
7	39	19	14
8	33	18	14
9	31	17	11
10	28	14	11
11	25	14	10
12	25	13	8
13	22	11	8
14	22	11	8
15	19	11	8
16	19	10	7
17	18	8	6
18	17	8	6
19	17	8	6
20	17	8	6
25	14	7	6
30	11	6	6

How to read this table?
If my gilt isolation barn is separated into **12 airspaces** and my **estimated prevalence is 3%**, I need to **sample 25% of my pens.**

- As demonstrated by table 3, it takes significant routine testing and labor to sample sufficient animals for early detection of ASF. When individual samples such as serum are taken, each air space must be considered an independent sampling exercise, whereby samples are collected according to the table because pathogen prevalence can vary substantially between air spaces (rooms, barns, sites).
- Daily observation for clinical signs is a necessary complement to diagnostic testing.
- If ASFV exposure time is known, antibody detection can be determined using this table at least 14 – 21 days post-exposure.

1.4 Gilt Isolation

Mhp decision tree:

Step 2: Actions Based on diagnostic results.

Option A

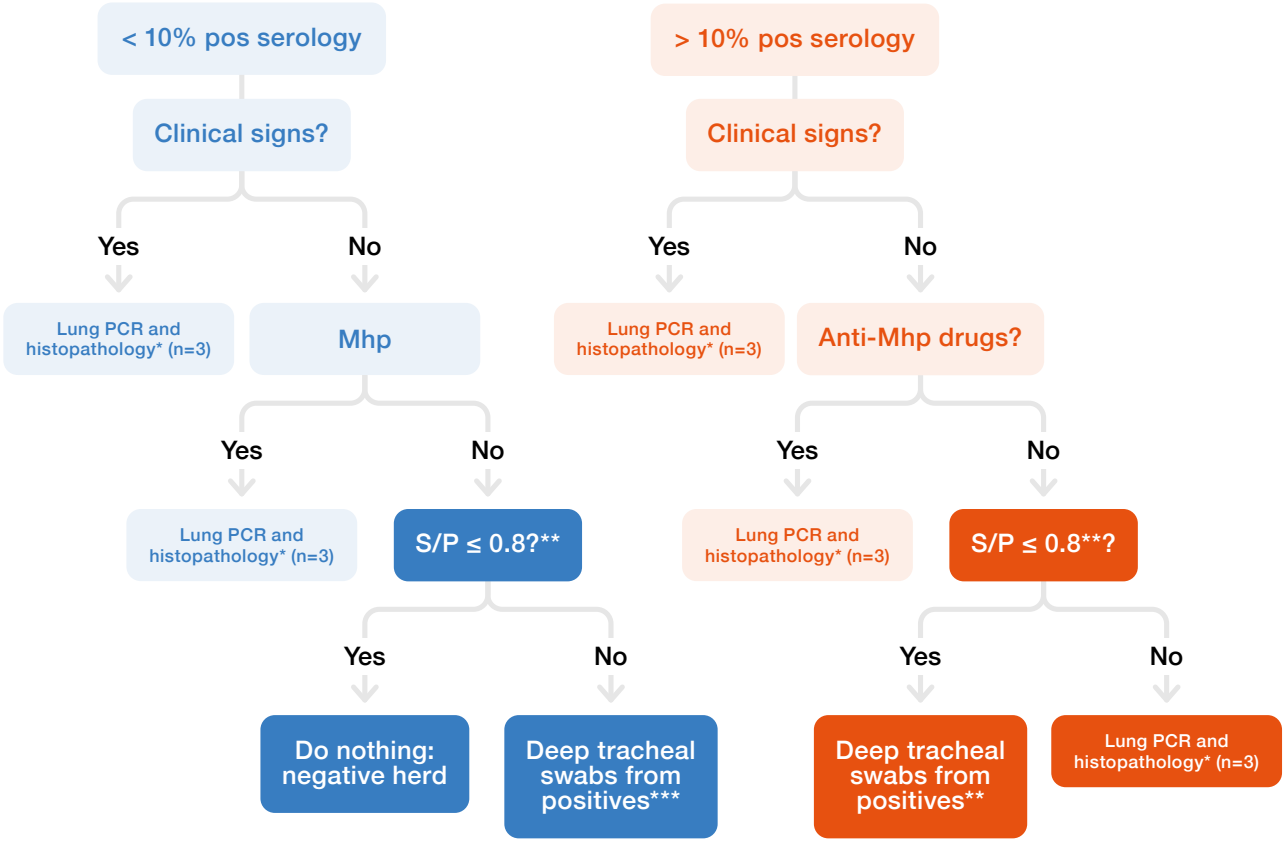
Define your *Mycoplasma hyopneumoniae* status:
Decision tree for a Mhp naïve herd in unvaccinated gilts.

If the sow herd is considered free of Mhp and based on the decision tree the gilt pool is diagnosed as Mhp positive, the gilts should be considered finishing pigs and not introduced into the breeding herd.

→ *How to restrain a pig (Page 69)*
→ *How to collect deep tracheal swabs (Page70)*
→ *How to collect serum samples (Page 71)*

Mhp quarantine: *Option A – Starting with serology*

Based on serology of > 60 gilts serum samples collected after at least 28 days of quarantine period



PCR, histopathology. Population will be considered Mhp-positive with positive PCR, microscopic lesion compatible with Mhp infection and clinical signs (dry coughing). | ** Emperical threshold personal communication Daniel Linhares. | * If PCR-positive on deep tracheal swabs, repeat serology with at least 30 pigs after 21 days from the first sampling.*

1.4 Gilt Isolation

Mhp decision tree:

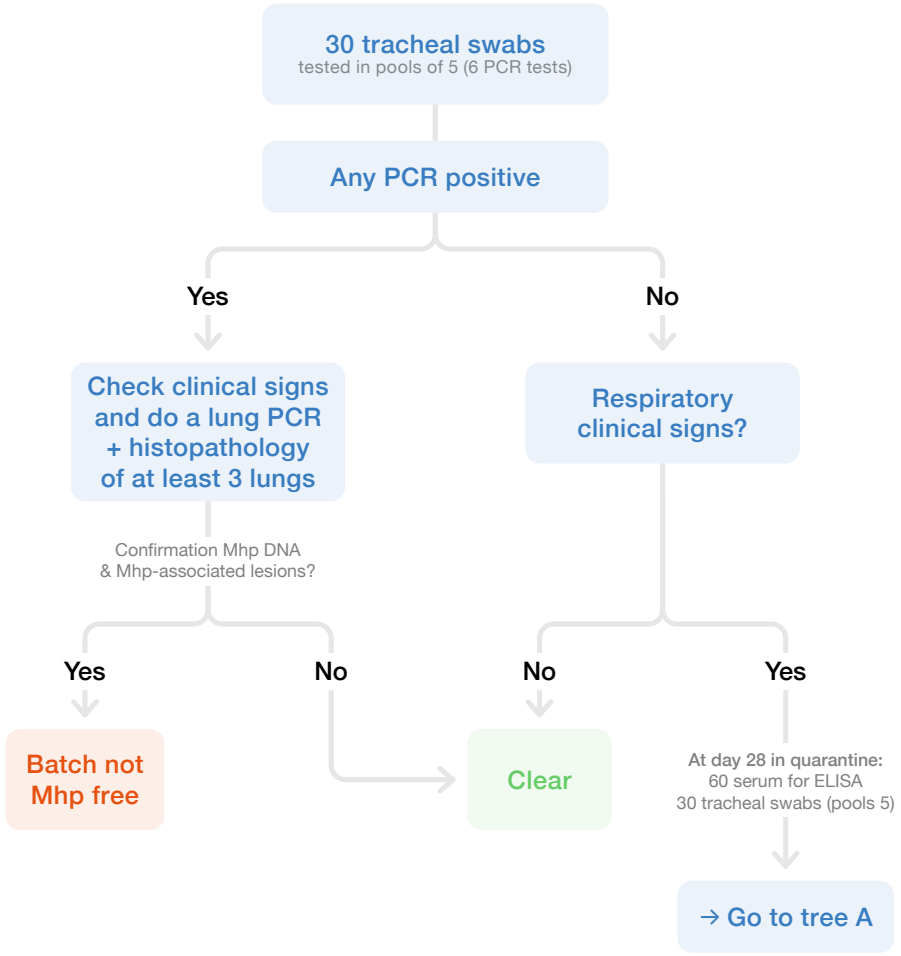
Step 2: Actions Based on diagnostic results.

Option B

Define your *Mycoplasma hyopneumoniae* status:
Decision tree for a Mhp naïve herd in unvaccinated gilts.

Mhp quarantine: *Option B – Expedited version*

At 21 days post isolation (e.g.: post arrival at quarantine)



What if my gilt pool is still from Mhp-negative source, but has been vaccinated? Can I still use this decision tree?

The answer depends on the vaccine used, the number of doses, and time-lapse between vaccination and testing. In short, we know that 1 dose of Ingelvac® MycoFLEX ≥ 3 – 4 weeks prior to testing will not induce seroconversion using the IDEXX kit. In such a scenario this decision tree is still valid.

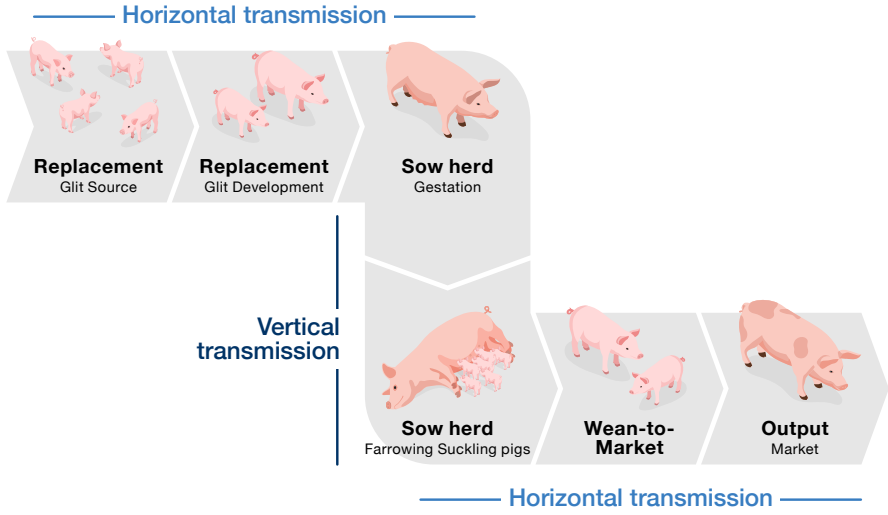
What if my incoming gilt pool is from a Mhp-endemic herd to be introduced into another endemically infected breeding herd?

In that case we recommend vaccinating the gilt pool at least 3 – 4 weeks before introduction into the breeding herd. Serology in this situation is much trickier to interpret and thus this decision tree is not valid. Instead, we recommend testing the gilt pool for Mhp activity using PCRs.

Deep tracheal samples are the most sensitive specimen, and oral fluids are the most practical. See *table 1 on page 35* for a table with sample size guidelines depending on the specimen used. For gilts from endemically infected source the ideal would be to introduce PCR-negative gilts. In reality, the goal is to work with the lowest positivity as possible.

Whenever possible, consider doing genetic sequencing on Mhp from the available gilt source(s) and the recipient breeding herd – ideally, the donor herd and recipient herd share similar Mhp strains.

Prevention chain



"The infection/prevention chain concept brings together new and existing knowledge in swine diseases management"

—Dr. Eduardo Fano

Global PRRS Solutions

Boehringer Ingelheim

What's the role of vaccination in *Mycoplasma hyopneumoniae* control?

Vaccination is a useful tool to control the clinical and production impact of Mhp, including all the links in the production chain: gilts, adult females and piglets.

Revaccination of replacement females after the earlier exposure phase helps group homogenization, since we know that the immune response as a result of field infection is irregular between individuals (*Betlach et al., 2021*).

To complement, routine vaccination of the breeding stock will help to maintain a homogenous immune status that has been initiated by promoting early exposure of the agent.

And finally, vaccination of piglets helps to maximize immunity throughout the production phase, reducing the impact of infection on health and growth.

Can we estimate the relevance of vaccination in the overall control program?

Vaccination does not prevent Mhp infection but can reduce the development of lesions.

Considering that Mhp control requires a multidimensional approach, the relative importance of gilt, sow and piglet vaccination within a holistic control program will depend on the individual farm characteristics.

It is important to say that farms with good biosecurity, management and vaccination processes will show better results when compared with farms with deficient processes. Reducing gilt to piglet transmission will certainly improve the overall efficacy of piglet vaccination.

What can we do if bringing Mhp naive gilts into an endemic sow herd?

It is critical to ensure immunity to Mhp as early as possible to reduce sow to piglet transmission. There are different ways to achieve this including the use of Mhp vaccines (*Betlach et al., 2021*). The different methods to acclimatise gilts require further study (*Takeuti et al., 2023*).

Betlach et al., 2021 ↗

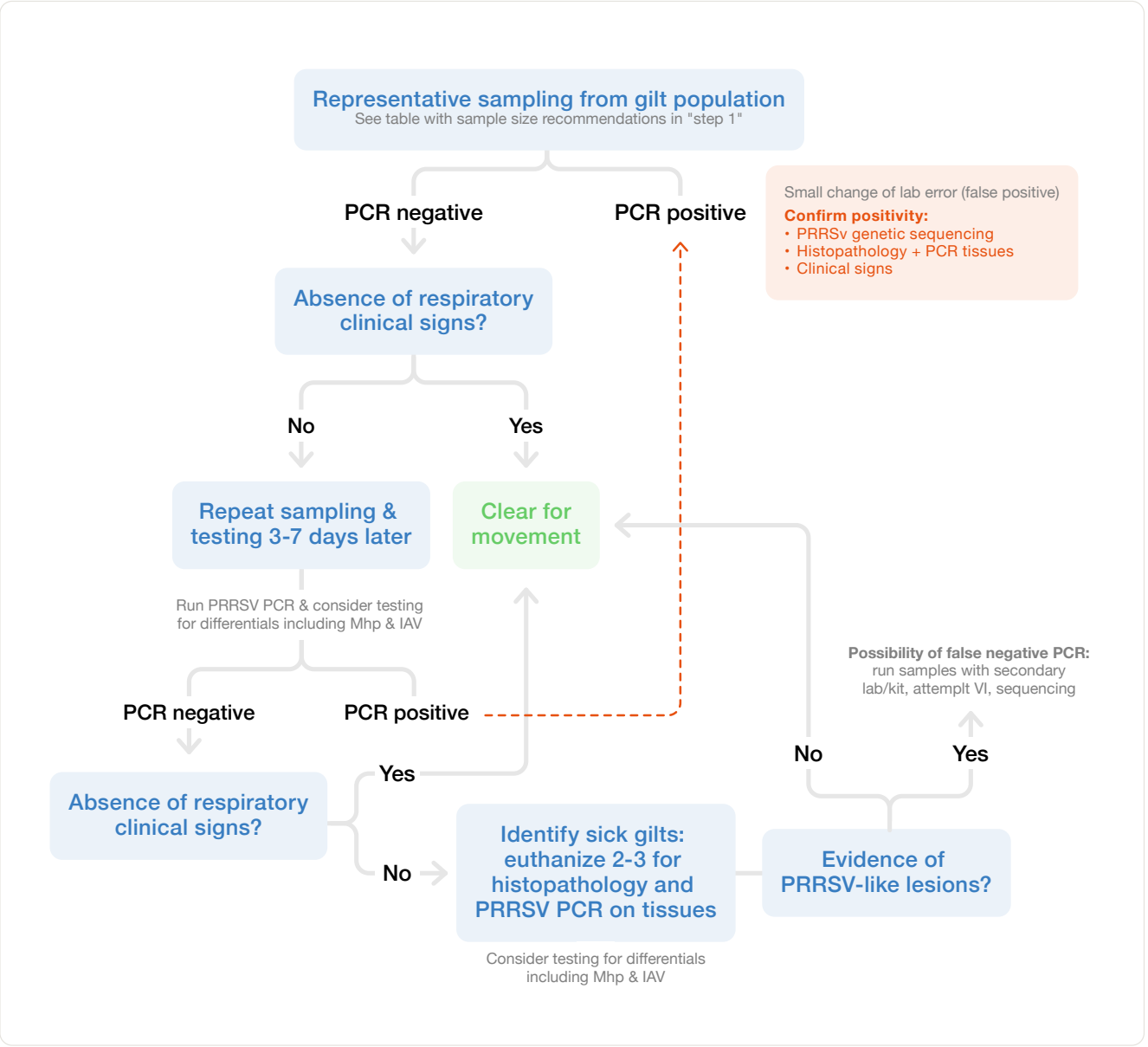
Takeuti et al., 2023 ↗

1.4 Gilt Isolation

PRRS decision tree

Step 2: Actions based on diagnostic results.

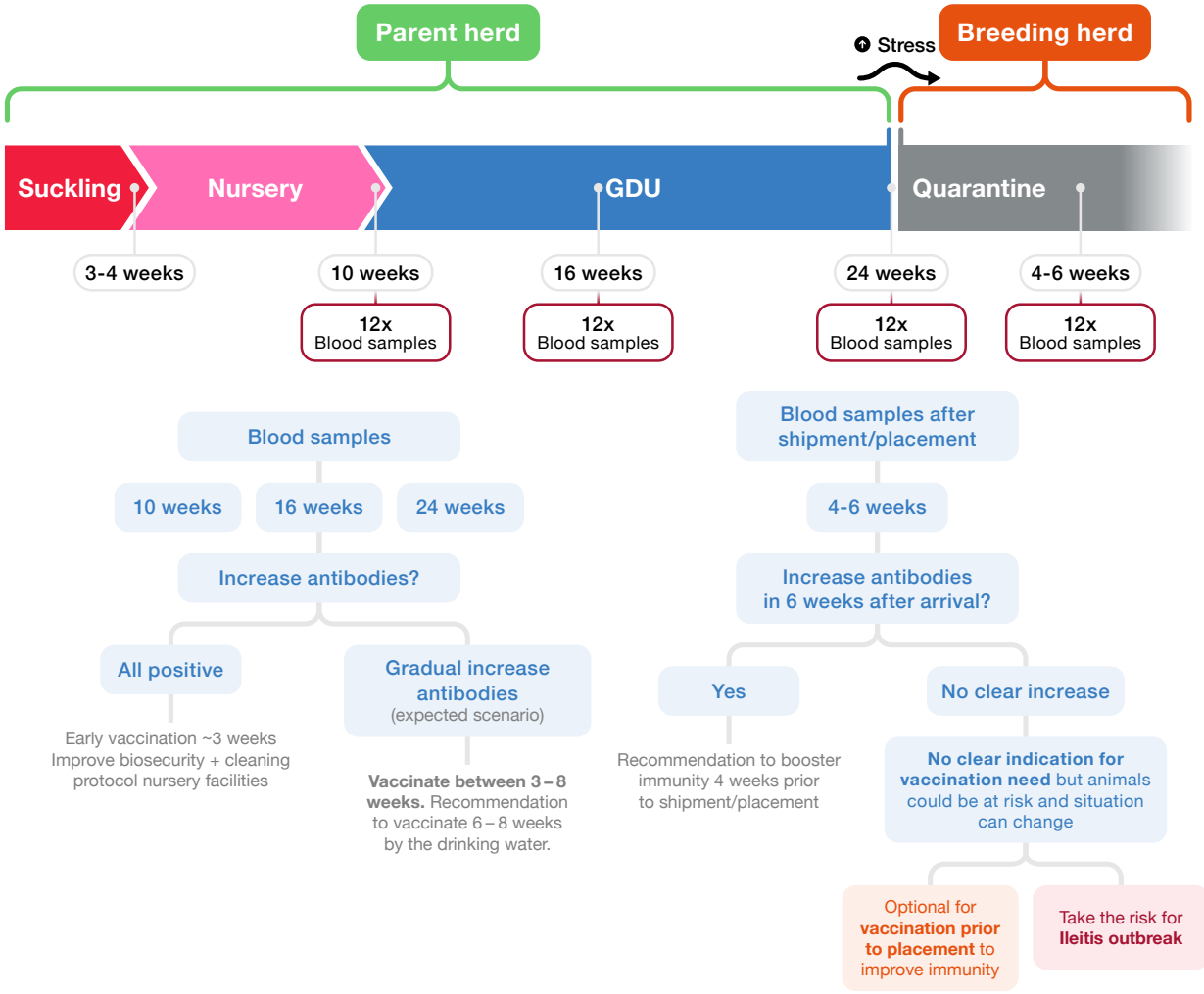
Define your PRRS status: Decision tree for a PRRS naïve herd and naïve gilts.



→ *How to collect serum samples (Page 71)*

1.4 Gilt Isolation

Ileitis decision tree



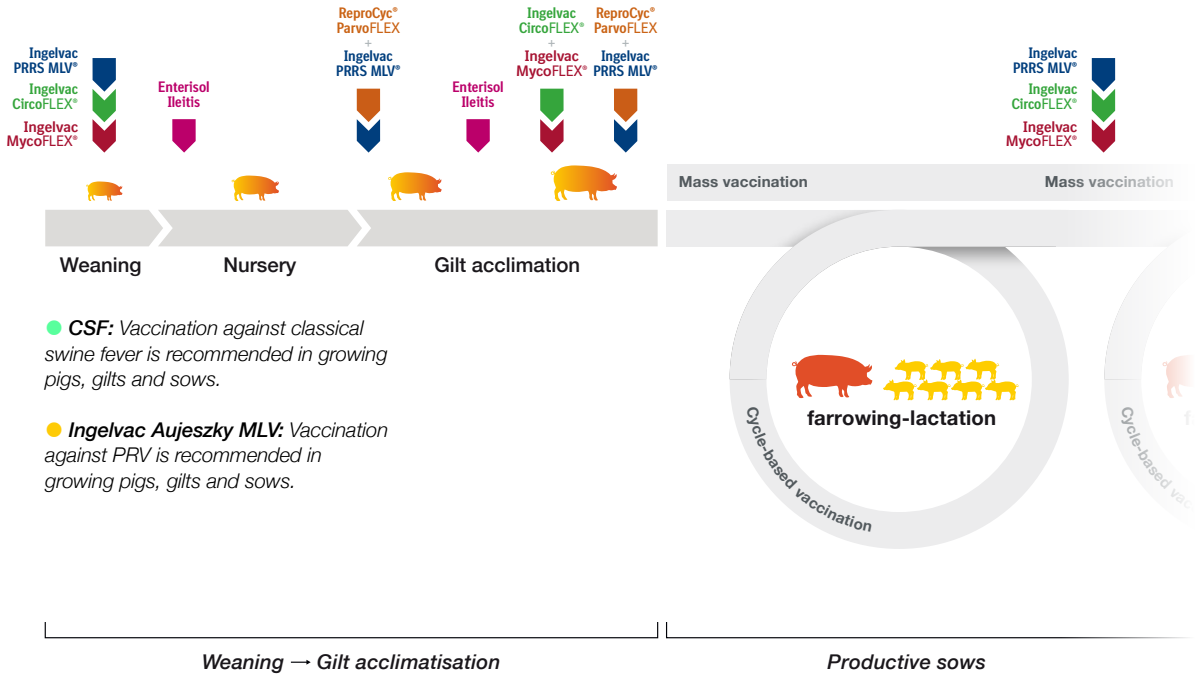
1.4 Gilt Isolation

Step 3: Pamper your princess – Vaccination guidelines for proper immunization.

Gilt and sow management sets the tone for future productivity of the sow farm.

- The vaccination protocol must be developed by the herd veterinarian, considering the endemic pathogens in the farm.
- The vaccination schedule should be planned so that it can be reconciled with the gilt development program.
- It is recommended that the last vaccination occurs at least 3 weeks prior the first breeding.

For modified live virus vaccine virus vaccines such as Ingelvac® PRRS MLV, the gilt introduction into the breeding herd should happen after the viremia and shedding post vaccination are resolved, as measured by PCR testing from serum and oral fluids, respectively.



Global PRRS Solutions

Boehringer Ingelheim

1.4 Gilt Isolation

Step 3: Pamper your princess – Vaccination guidelines for proper immunization.

Ingelvac® PRRS MLV

Ingelvac® PRRS MLV: modified live vaccine with global trackrecord of heterologous protection. Best to use as mass vaccination 3 – 4 times per year. Can be mixed with ImpranFLEX adjuvanted vaccines such as Ingelvac CircoFLEX, MycoFLEX and ParvoFLEX.

ReproCyc® ParvoFLEX

ImpranFLEX adjuvanted 27a PPV1 vaccine protecting against old and new, dominant PPV1 strains (e.g. 27a). Can be administered as mass vaccination twice per year.

Ingelvac CircoFLEX®

Gilts should receive the first PCV2 vaccination at weaning and a booster should be in place around 12 weeks of life. A third vaccination is desirable after selection, at 20 weeks of life.

From the second parity, it is recommended a PCV2 booster vaccination at every reproduction cycle, around the week 8 of gestation. The objective is to stabilize the herd immunity and maintain higher maternal antibodies levels in colostrum, to ensure piglet protection during first weeks of life.

Ingelvac MycoFLEX®

As for PCV2, *Mycoplasma hyopneumoniae* vaccination should take place at weaning and a revaccination is recommended around 12 and 20 weeks of life.

The gilt acclimatization for *M. hyopneumoniae* is a particularly important topic and should be one of the first priorities when receiving the replacement gilts in the farm.

ENTERISOL® enteric solutions

For the active immunisation of pigs from the age of three weeks against intestinal lesions caused by *Lawsonia intracellularis* infection and to reduce growth variability and loss of weight gain associated with the disease.

The first oral modified-live vaccine for protection from the harmful effects of *Lawsonia*.

Provides active live protection of gut health by stimulating the mucosal immune response.

Global PRRS Solutions

Boehringer Ingelheim

1.5 Deep Dive – PRRS

Disease specific recommendations for PRRS

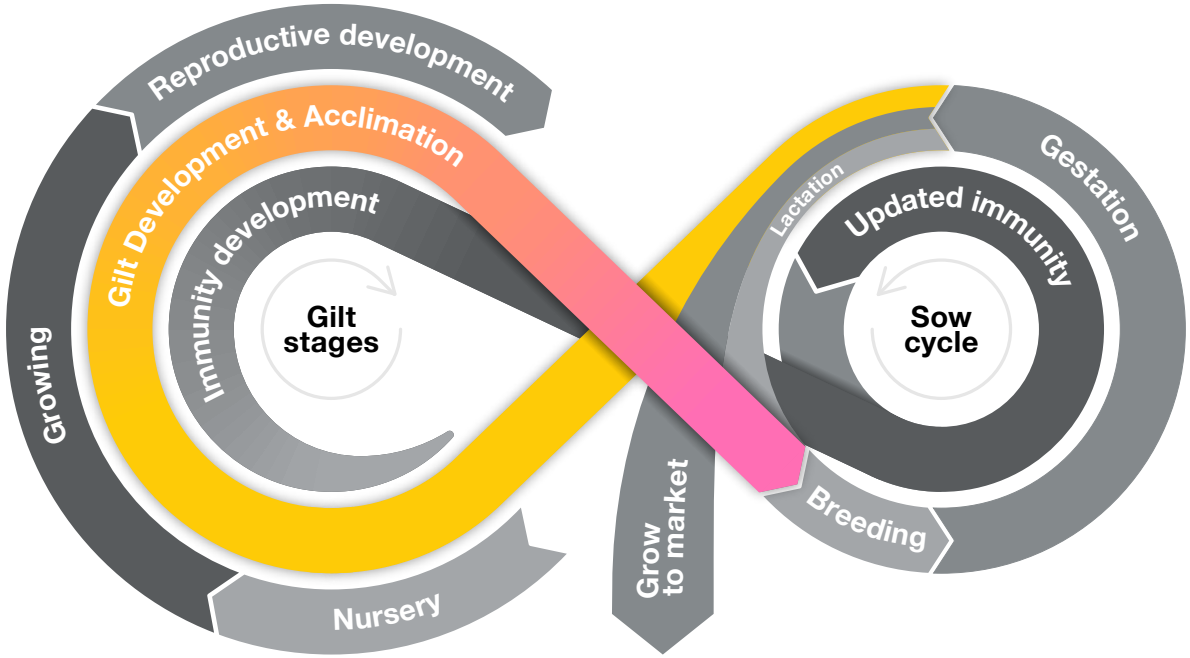
The Metrics

The goal

- Immunized & non-shedding gilts into endemically infected herds.
- Negative gilts into negative herds.

How to assure my gilt acclimation is successful?

- ✓ Maintenance of PRRSv status: no increase in PCR positivity or drop in Cts in the breeding herd and suckling pigs.
- ✓ Maintenance of productivity in the breeding herd: no spike in aborts, sows off feed, sow mortality, preweaning losses from birth to weaning.
- ✓ Maintenance of downstream productivity (grow-finish): no worsening of mortality, co-morbidities, or ADG.



Global PRRS Solutions

Boehringer Ingelheim

1.5 Deep Dive – PRRS

How to achieve & measure "immunized non-shedding" status

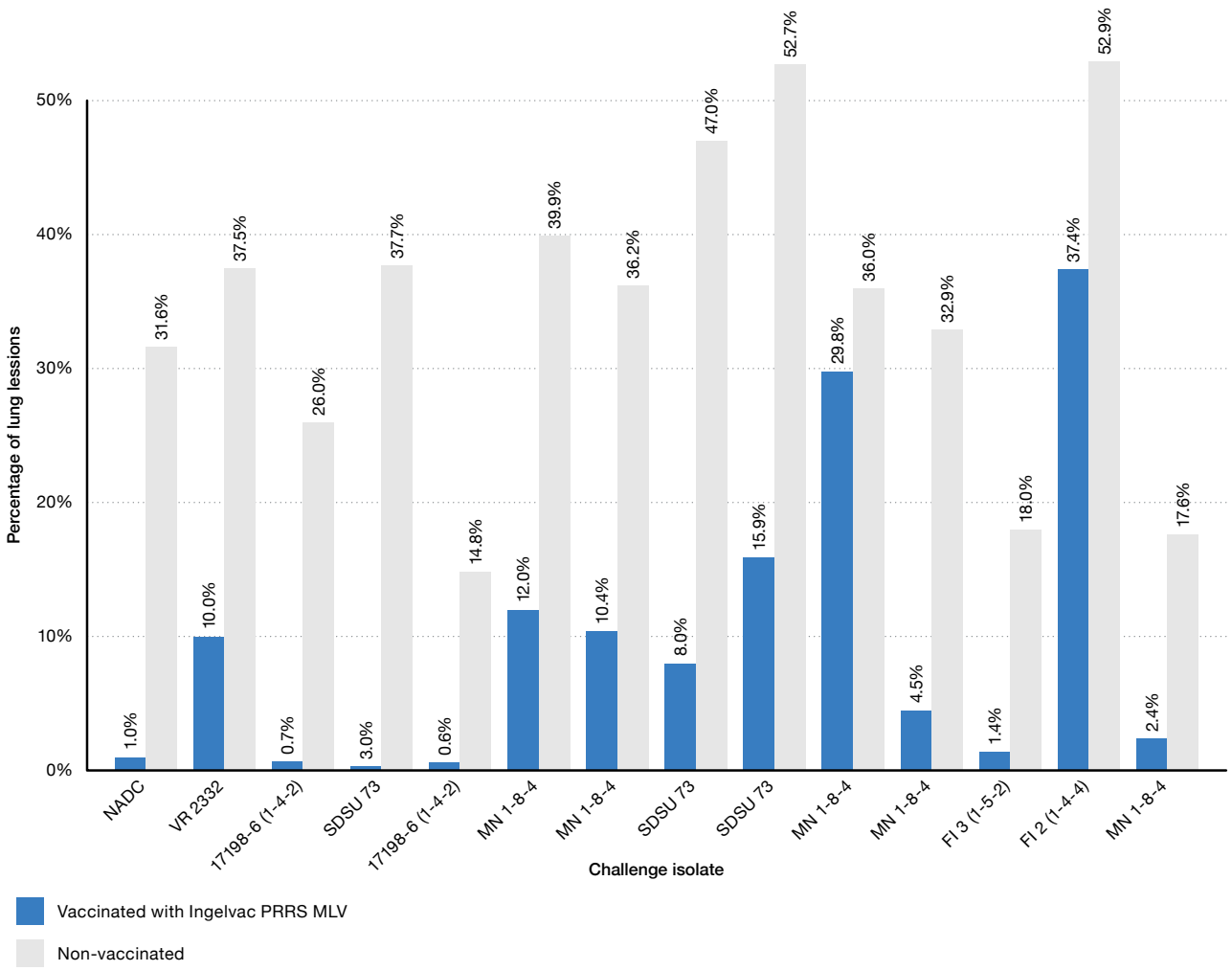
Immunize **Cool down**

A proper immunization provides consistency of exposure and a homogeneous population without vulnerable sub-populations. It gives the ability to develop repeatable protocols for repeatable and consistent results over time and for different herds of different sizes, structures, flows.

- Ingelvac® PRRS MLV has been repeatedly shown, to consistently provide a solid herd immunity to pig populations, mitigating the clinical consequences of subsequent infections with wild-type PRRSv of different lineages and strains.

The advantages of modified live virus vaccines include:

- Consistency of the exposure
- Repeatability of the protocol
- Safety of the immunization, avoiding non-planned exposures to other pathogens including parvovirus, Seneca virus A, Sapelovirus, etc.



Philips et al., 2013 – Allen D. Leman Swine Conference

Graph 20. Percentage of lung lesions in vaccinated and non-vaccinated pigs challenged with PRRSv

1.5 Deep Dive – PRRS

How to achieve & measure "immunized non-shedding" status

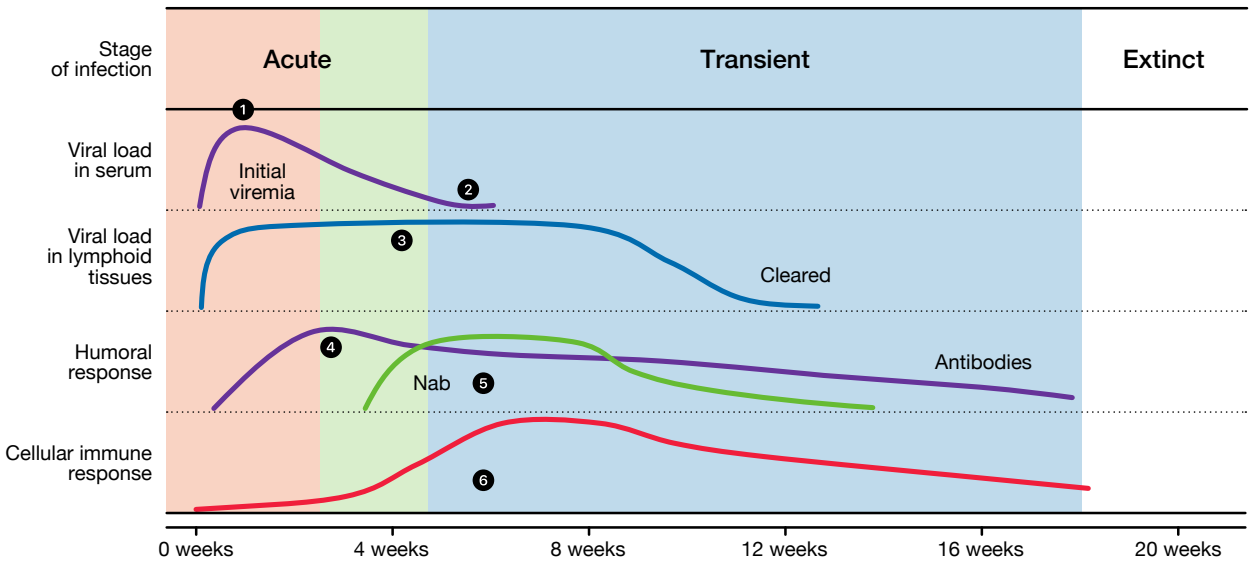
Immunize **Cool down**

The protective immunity against PRRSv takes time to mount. Experimental studies demonstrate that the protective immunity develops 5 – 8 weeks post infection as demonstrated by the viremia period. After the viremic period is resolved, pigs can still shed and transmit the virus for a few months as described below. Thus, it is important to allow ideally 3 months post immunization with live virus for gilts to develop a solid immunity and clear viremia and shedding.

A proper gilt isolation and acclimation needs to reflect these immunologic processes and should be long enough to clear the vaccine virus (1+2) and allowing the to build up a protective immunity (5+6).

A 12 week gilt acclimation protocol takes these immunologic specification into account and allows to introduce non shedding gilts into the sow herd.

Lunney et al., 2016 ↗



❶ PRRSv replicates in lung Macrophages resulting in **viremia** by 6 – 12 hours post infection and may last for several weeks **despite presence of Antibodies.**

❷ Later during the infection, virus replication subsides and can no longer be detected in blood and lungs.

❸ At this stage. PRRSv replicates in lymphatic tissues. Replication slowly decays until the virus becomes extinct. A proper gilt acclimation will reduce the risk of introducing "hot" viremic pigs into the sow herd.

❹ The **initial Antibodies** can be detected 7 – 9 days post infection. They are quick but **not protective.**

❺ **Neutralizing Antibodies** (Nab) appear later at day 28 after infection but are important for **protection.** The level of cross-protection of NAb are not properly understood and vary according to pig's and virus strain's properties.

❻ **Cellular immunity** is key for an **effective protection.** This respond takes at least two weeks and is initially low. But once the cellular immune response took off, **the viral load in tissue drops** and gets cleared eventually.

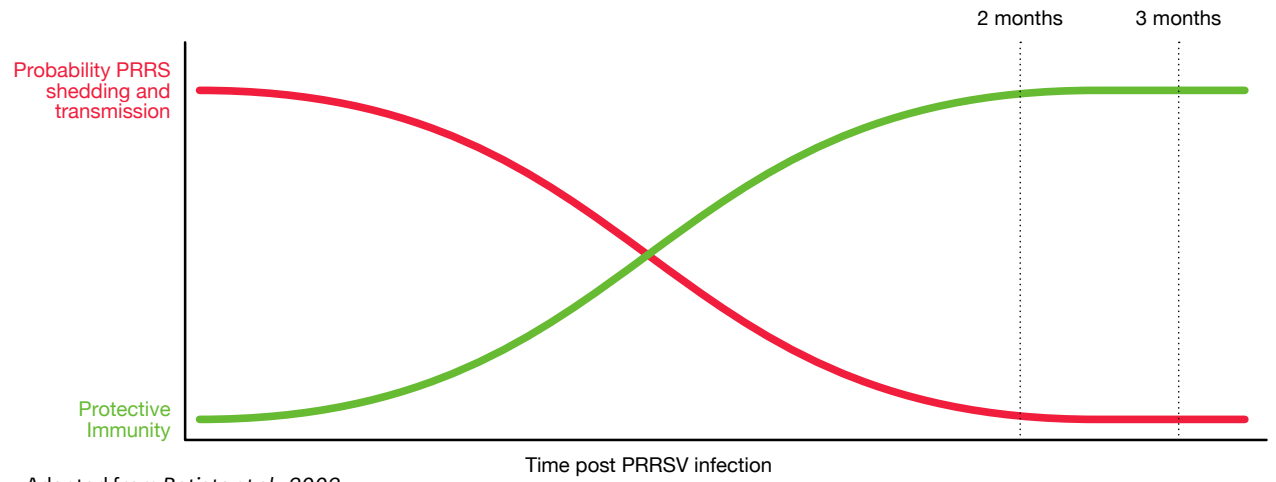
Why should I keep 12 weeks of Quarantine/Isolation?

Isolation, also known as quarantine, is implemented for biocontainment and bioexclusion purposes. The goal is to protect gilts from disease outbreaks while they build up their immunity after vaccination matching the health status of your sow herd.

Secondly you want to prevent introducing "hot" PRRS shedding gilts and transmission of diseases to the breeding herd.

Even though the duration of shedding and transmission of PRRSv might be slightly different from gilt to gilt, Laura Batista proved that generally it doesn't exceed 3 months *(Graph 6)*.

120 gilts of 4 months of age were experimentally infected with wild-type PRRSv and commingled with 30 naïve sentinels 90 days post-infection. None of the sentinel pigs became infected based on clinical observations, ELISA, and PCR testing. This groundwork supports the recommendation of allowing 3 months of 'cool down' after exposure to live PRRSv. We believe the cool-down period is sufficient to develop protective immunity and quit viral shedding – the optimum status for gilt introduction in endemically infected or stable herds.



Graph 21. Development of immunity and reduction of virus shedding over time.

Sampling considerations

Desired PRRSv health status of gilts upon introduction into the breeding herd:

	Vax.	PCR	ELISA
Gilts to endemic farms	Yes	⊖	⊕
Gilts to stable farms staying on 2vx	Yes	⊖	⊕ / ⊖
Gilts to stable farms going negative	Yes	⊖	⊕ / ⊖
Gilts to naïve farms	No	⊖	⊖

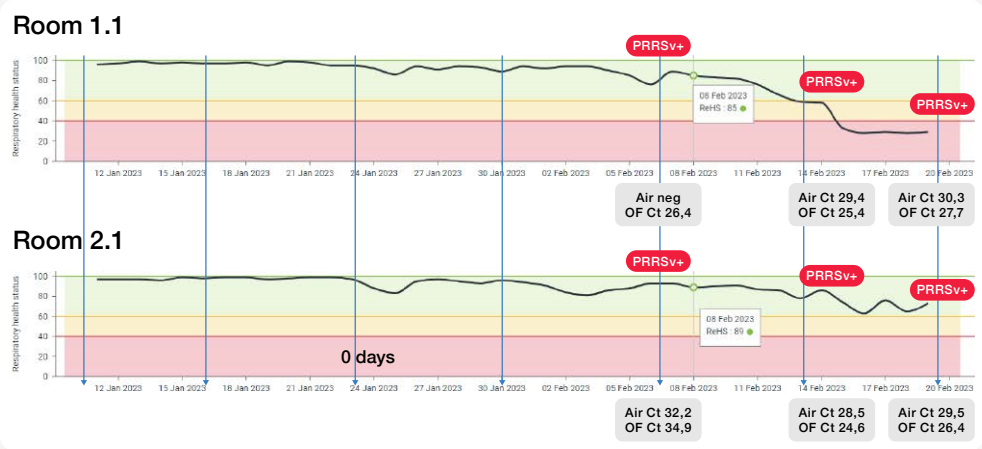
Batista et al., 2002 ↗

Introducing immunized, non-shedding gilts to my sows is the goal, How can I verify this desired status?

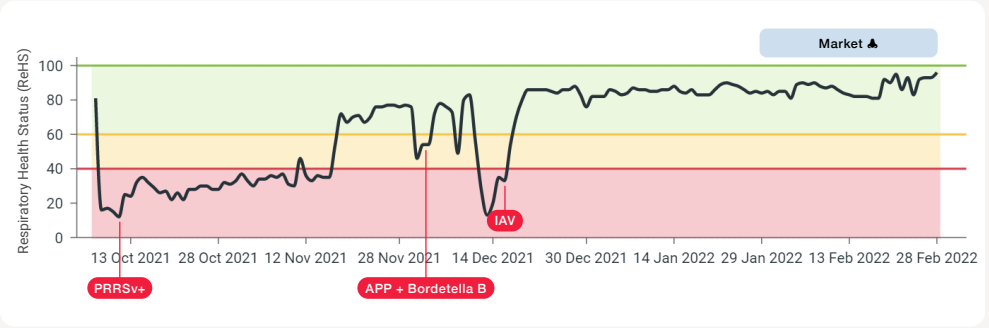
Clinical and diagnostic monitoring are strategically implemented in gilt populations to ensure their health status upon introduction to the breeding herd. Specifically:

A. Clinical observations (signs of disease)

- Watch for respiratory signs such as respiratory distress, coughing, or sneezing can be a sign of herd immunity disruption allowing endemic pathogens to cause disease. Alternatively, unexpected clinical signs are also indicators of disease outbreaks due to the introduction on pathogens such as PRRSv or Mhp in the gilt flow.
- **SoundTalks®:** closely monitor respiratory health. Clinical monitoring relies on the caretaker's ability to detect clinical signs, identify patterns, and to timely communicate the veterinarian the findings. The advantage of SoundTalks®, is that respiratory monitoring can be done in objectively, consistently and continuously 24h per day, 7 days per week, with automated, and real-time signals issued to veterinarians providing a more precise information. *(Graph 7)* and the following graphs show different examples of 2 PRRS negative groups of pigs becoming positive *(Graph 7)* and PRRS endemic group of pigs monitored with SoundTalks®.



Graph 22. Respiratory health status (ReHS) graph from 2 initially PRRS negative groups of pigs' sound-monitored during their nursery period. Vertical arrows indicate when a sampling event took place (1 air and 2 oral fluids' sample were taken) and PRRS status of the room indicated in red above the graph (Ct value results in brackets). ReHS graph negative trend (increased respiratory health levels) matches with PRRS status change to positive.



Graph 23. Respiratory health status (ReHS) graph from an endemic PRRS groups of pigs' sound-monitored during their finishing period. Red vertical arrows indicate diagnostic results and pathogens responsible for the 3 outbreaks detected. The first 4 weeks with low ReHS values (red alarms) were caused by PRRS virus after placement.

B. Diagnostic monitoring (virus activity)

At designated routine intervals, i.e., weekly, and in response to clinical observations, diagnostic monitoring is required to characterize the health status of the gilt population with precision. Some examples include PCR in oral fluids to monitor shedding; and ELISA in oral fluids or serum to assess prior exposure (presence of antibodies.

To verify the success of your gilt introduction with Diagnostic monitoring you have 2 options:

- B1. Compare PRRS health status from gilts (P1) with sows (P2+)
- B2. Track your PRRS status over time based on AASV classification

B1. Compare PRRS health status from gilts (P1) with sows (P2+)

When the gilt is properly acclimated and the receiving breeding herd is well managed to PRRSv infection, the parity 1 offspring will have similar diagnostic results than that of older parities. In contrast, poorly acclimated gilts introduced into an endemically infected breeding herd will produce litters with higher pressure of PRRSv infection.

As described in the PRRSv Ctrl 2.0 book, one way to measure the PRRSv activity in breeding herds is by sampling the suckling pig population by serum or FOF (table below). Comparing the diagnostic result from parity 1 versus parity 2+ will reveal how well PRRSv is being managed in the gilt and the breeding herd.

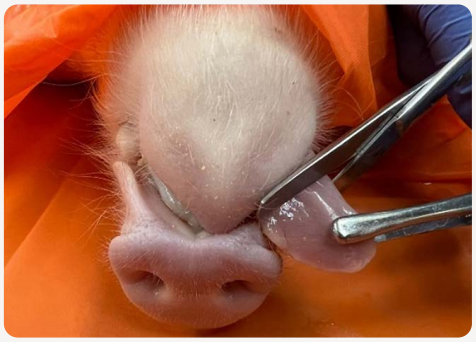
Introducing immunized, non-shedding gilts to my sows is the goal, How can I verify this desired status?

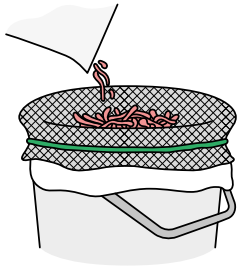
 Parity 1	PRRSv wild type detection in litters from:	 Parity 2+	
⊖ Negative		⊖ Negative	Well designed Quarantine and PRRS Stable sow herd.
⊖ Negative		⊕ Positive	Well designed Quarantine but unstable sow herd. Check for lateral infection and improve biosecurity and management (COMBAT). If possible apply whole herd vaccination (Sow and piglets).
⊕ Positive		⊖ Negative	Revise and improve gilt acclimation including the immunization and cool down period specifically for PRRSv. Sow herd currently stable but at risk of breaking.
⊕ Positive		⊕ Positive	Revise and improve gilt acclimation including the immunization and cool down period specifically for PRRSv. Improve Biosecurity and management (COMBAT) and if possible apply whole herd vaccination (Sow and piglets).

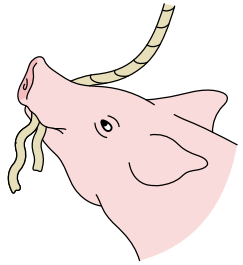
PRRSv Ctrl 2.0 book ↗

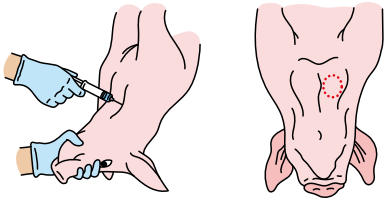
B1. Compare PRRS health status from gilts (P1) with sows (P2+)

The moment of truth - how to verify if gilts were properly acclimated to PRRSv?









Comparing PRRSv activity in offspring from gilts versus sows

It is well documented that gilt litters are more likely to test positive for PRRSv than sow litters. One way to ensure gilts are well acclimated to the virus and that the infection pressure is under control in the whole breeding herd is to monitor parity-one (P1) litters separately from older sows (P2+).

The expectation is to obtain similar PCR results when comparing P1 and P2 offspring. More specifically, these groups should not have significant differences in positivity or Ct values.

Sampling considerations

As described in detail in the PRRSv Ctrl 2.0 manual, there are several sample types that can be used to assess PRRSv activity in the farrowing room.

Briefly, tongue tip fluids (TTF) from stillborn pigs are great indicators of PRRSv activity in the breeding herd. Processing fluids (PF) indicate PRRSv activity in 2 – 7 days old piglets when physical castration is performed. Conversely, TTFs from newborns are bonafide alternatives to PFs. Family oral fluids (FOF) or serum can also be collected from weaning-age piglets to determine the PRRSv activity in that age group. These sample types can be pooled within the respective sub-populations of interest (P1 and P2+ litters) to compare the viral activity in gilts and sows.

Again, results from P1 offspring should not differ from that of P2+. Higher PCR positivity of P1 litters compared to P2+ reveals a clear opportunity to revise and improve gilt acclimation, including the immunization and cool-down period specifically for PRRSv.

B1. Compare PRRS health status from gilts (P1) with sows (P2+)

How many samples do I need to take?

Prevalence (%)	# Serum samples	# FOF samples
~9	30	5
~5	60	7
~3	90	10
~2	120	15
~1	240	30
~0.5	400	40

Table 13. Number of serum and FOF samples to achieve 95% confidence to detect PRRSv at different prevalence scenarios.

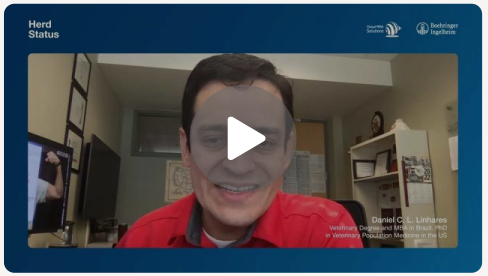
Example: 90 serum samples or 10 FOF, per air space, is needed to achieve 95% confidence to detect at least 1 sample positive when prevalence is 3% or higher.

Sample allocation

Ideally, samples should be collected to maximize the population coverage, for example, by sampling all pens in the GDU. When there is budget constraint, pooling samples can be implemented, as opposed to limiting the sample size. When labor is a limitation, a risk-based approach can be implemented based on the pathogen of interest. For PRRSv, it is well known that gilt litters and relatively small litters are more likely to test positive than parity 2+ or large litters. Thus, samples should be collected from those sub-populations at higher risk.

In addition to serum and FOF, tongue tip fluids from stillborn pigs can also be collected from P1 and P2+ litters. PCR-positive TTF are great indicators of PRRSv activity in the breeding herd. Again, results from P1 offspring should not differ from that of P2+. Higher PCR positivity of P1 litters compared to P2+ reveals a clear opportunity to revise and improve gilt acclimation including the immunization and cool down period specifically for PRRSv.

B2. Track your PRRS status over time based on AASV classification



If the AASV classification is conducted on regular bases, changes in the PRRS status become visible and the gilt introduction may play an important role. Find more details in the table below and what requirements needs to be fulfilled to achieve the desired status.

Category	Description	Condition for entry	Condition for stay
1a	Positive unstable High prevalence	Untested/insufficiently tested herds. Outbreak	Same as conditions for entry
1b	Positive unstable Low prevalence	75% of PCR tests for 90 days negative for PRRSv	75% of PCR tests in 90 days negative for PRRSv
2vx	Positive stable w/Ongoing MLV exposure on incoming gilts or sows	Wild-type PRRSv negative for 90 days (molecular testing)	PCR tests
2	Positive stable not vaccinating	PRRSv PCR-negative for 90 days	PCR tests
3	Provisional Negative	ELISA negative tests in sentinel gilts, 60 days post entry into the breeding herd	Periodic monitoring (≤ 6 months)
4	PRRSv naïve	ELISA negative tests	Periodic monitoring (≤ 6 months)

1.5 Deep Dive – Ileitis (*Lawsonia intracellularis*)

When do gilts shed *Lawsonia intracellularis*?

Peak shedding between breeding gilts occurs between 12 and 15 weeks of age (Jacobson et al., 2010) and single animals were seen PCR positive at the age of 24 – 36 weeks *(Table 7)*.

This is also in line with Boehringer's database on seroconversion showing the biggest part of the seroconversion in the early and late finishing period between the age of 12 and 18 weeks, whilst infection in herds is slowly spreading. Transmission of *Lawsonia* between breeding herds and recipient herds is demonstrated (Jacobson et al., 2010). Challenge studies have also shown intermittent shedding of *Lawsonia* 24 days after infection (Guedes et al., 2017) which can result in lack of sensitivity by at random fecal sampling of gilt replacers. Individual breeding gilts have shown intermittent shedding for 15 – 24 weeks after seroconversion, but this could also indicate reinfection.

Table 14. Original from *Guedes et al.* showing intermittent shedding from 24 days until 35 days post infection.

	Number of days after inoculation									
	1	3	5	8	11	15	19	24	29	35
PCR	−/−	+/−	−/−	−/−	+/+	+/+	+/+	+/−	−/−	−/+

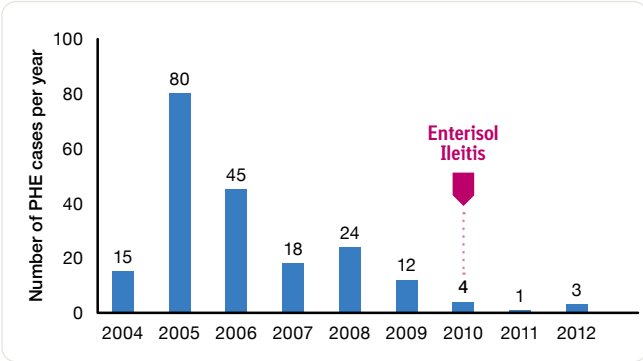
**The data are based on 2 pigs at each time point (NT = not tested).*

Shedding of *Lawsonia* is mainly observed around the time of first seroconversion between the age of 12-21 weeks. At a later age, shedding can occur during a second seroconversion around the age of 36 weeks (Jacobson et al., 2010). The interval between shedding and showing antibodies varied from 0 – 6 weeks. Since shedding can be intermittent, a serological profile of gilt developers 6 weeks before, upon and 6 weeks after arrival can indicate active infections amongst breeding gilts. *Lawsonia* shedding of periparturient sows can be low, where environmental samples from the same sows' farrowing crates showed a higher prevalence (Patton et al., 2021).

What are risk moments for ileitis in breeding gilts and how to prevent this with vaccination?

Based on the shedding patterns vaccination of the animals can be considered for two specific risk moments. First vaccination can be carried out between the age of 3 weeks until about 8 weeks of age, to induce immunity before the first wave of infections between 12 and 15 weeks. A second risk moment can be seen at the moment of replacement from GDU to recipient herd, with the general recommendation to vaccinate 4 weeks before shipment of the first cohort of gilt replacers, respecting sufficient time for onset of immunity (3 weeks, SPC). Vaccination timing should be evaluated with serological profiling to adapt the vaccination timing to the infectious risk moments. Oral vaccination of gilt replacers has been proven effective in reducing the number of PHE cases (Yoon et al., 2014, Waddell et al., 2003). Your veterinarian together with the Boehringer Ingelheim technical service managers can support you for diagnostic and vaccination recommendations for your specific herds.

Graph 24. From *Yoon et al.* Reduction of PHE after implementation of an oral vaccination program to control ileitis in breeding gilts.

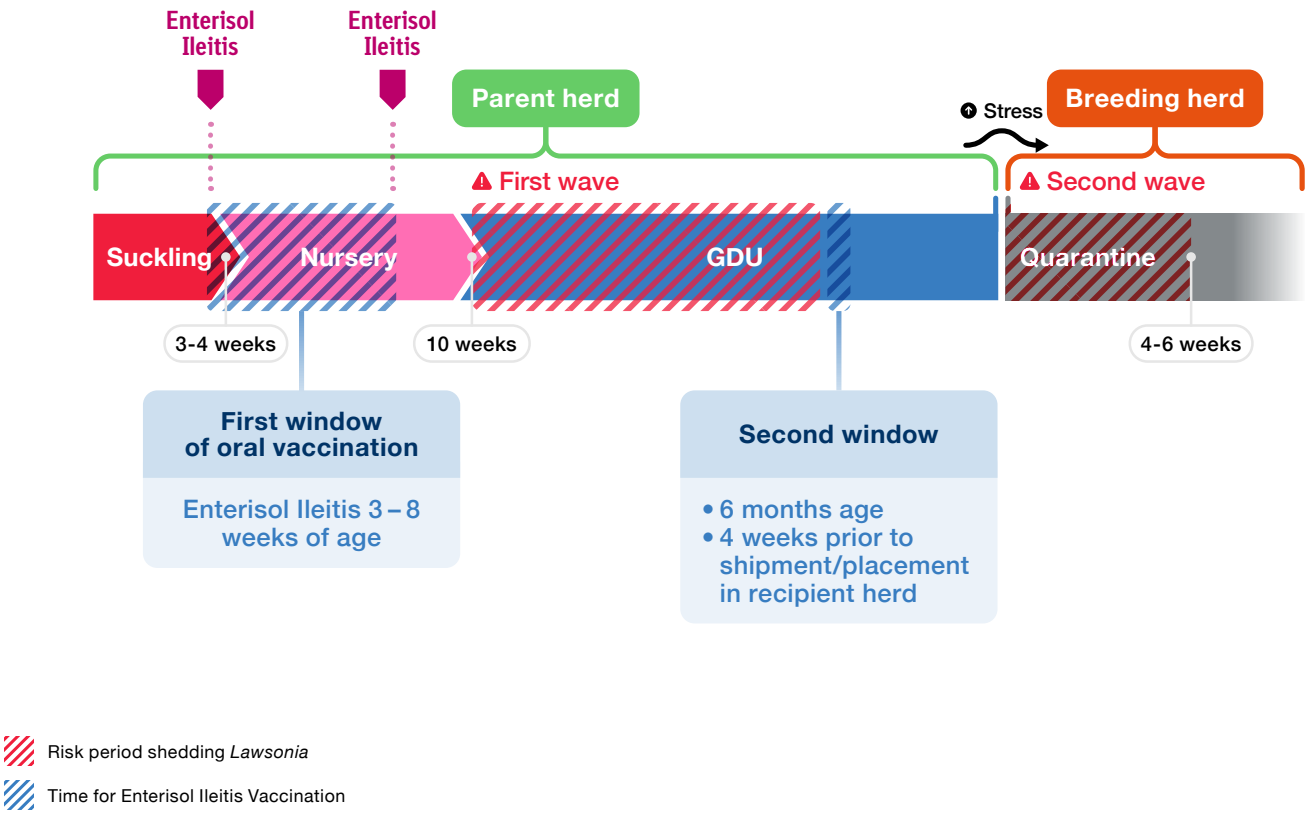


Can I prevent *Lawsonia* from coming into my sow herd?

The prevention of introduction of *Lawsonia* by gilts into a recipient herd is hard to control, and most sow herds are infected with high amounts of antibody positive animals. Vaccination does not prevent from shedding *Lawsonia*, but it does lower shedding *Lawsonia* 3-4 weeks after infection (Helm et al., 2021, Leite et al., 2021) lowering infectious pressure for the other animals. With the highest risk of shedding for the first 4 – 6 weeks after arrival in the recipient herd, a quarantine of the animals is recommended to prevent high infectious gilt replacers entering the recipient herd. Also attempts to eradicate *Lawsonia* from swine herds were unsuccessful or led to reinfection in a relative short period after eradication (*Collins et al., 2022*) showing the difficulty to prevent animals becoming infected with the ubiquitous enteric pathogen.

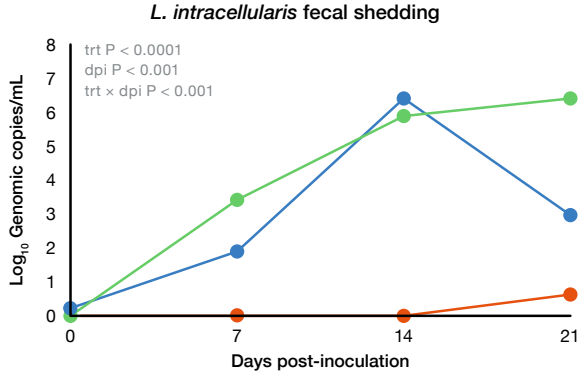
Enterics decision tree

The recommended vaccination protocol for gilts include 2 windows of vaccination.

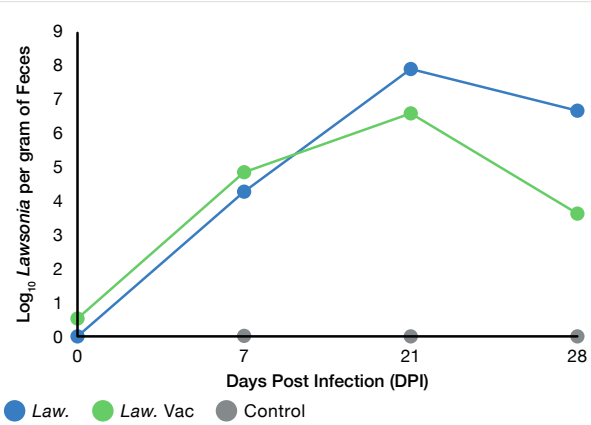


1.5 Deep Dive – Ileitis (*Lawsonia intracellularis*)

Graph 25. Original from *Helm et al., 2021.*



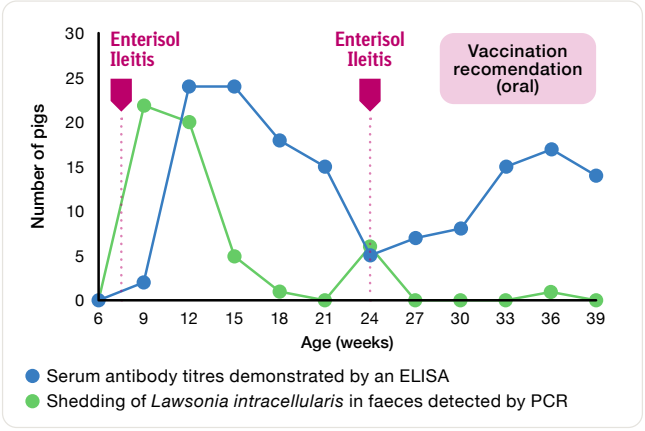
Graph 26. Reduced shedding after 3 – 4 weeks, original from *Leite et al., 2021.*



How about ileitis in a sow herd?

In some sow herds a breakthrough with ileitis infection can occur, but this is considered quire rare. In such events oral vaccination of sows can be considered. Oral vaccination during a PHE breakout has been proven effective in reducing the number of PHE cases in breeding sows in combination with an antibiotic treatment during the onset of immunity period of 3 weeks following vaccination (Schuttert et al., 2014). Your BI representative can advise you on what to do in these specific circumstances to induce immunity by vaccination an to protect the animals against infection during the window of onset of immunity after vaccination.

Graph 27. Original from *Patton et al.* it shows the two waves of the infection, between 9 – 15 weeks and at about 24 – 39 weeks some positive pcr results. Pink arrows indicate the vaccination moments. First in the nursery period, second booster 4 weeks before placement from the GDU to the sow herd. At about 6 month of age.



References:

Jacobson et al., 2010 ↗

Guedes et al., 2017 ↗

Patton et al., 2021 ↗

Yoon et al., 2014 ↗

Waddell et al., 2003 ↗

Helm et al., 2021 ↗

Leite et al., 2021 ↗

Collins et al., 2022 ↗

Schuttert et al., 2014 ↗

1.5 Deep Dive – PCV2

What would be the recommended PCV2 vaccination scheme for replacement gilts?

Replacement gilts should receive the first PCV2 vaccination at weaning (3 – 4 weeks of age) and a booster should be administered around 20 weeks of life, at the time of gilt selection.

It is recommended to also include a booster PCV2 vaccination during the gestation period. It can be done at every reproduction cycle, around the week 8 of gestation or as mass (blanket) vaccination, 2 or 3 times per year. The objective of this booster is to stabilize the herd immunity, ensuring homogeneous protection against PCV2 reproductive disease, and maintain higher maternal antibodies levels in colostrum, to provide piglet protection during first weeks of life. The PCV2 sow vaccinations also have the potential to improve piglets' weight at birth and at weaning and reduce the need for cross-fostering.

What are the benefits of vaccinating sows against PCV2?

The sow vaccination against PCV2 has been shown to be beneficial and is currently implemented in many production systems.

It is possible to vaccinate sows in 3 different moments during their production cycle: before mating (during lactation phase), during mid or late gestation. For defining the most appropriate timing we need to consider what is the main goal we want to achieve:

- To improve the reproductive performance in cases where PCV2 Reproductive Disease is an issue
- To improve piglet protection through maternally derived antibodies (MDA) in cases where early PCV Disease in nursery has been observed.

Sow vaccination before mating will stabilize and homogenize the PCV2 immune status of the sow population during gestation, improving some reproductive parameters as farrowing rate, piglets born alive, and piglets weaned per litter.

Sow vaccination administered during mid or late gestation will also homogenize the PCV2 immune status of the herd, and confer additional protection to piglets during their first weeks of life, through increased maternally derived immunity.

The major benefits observed in piglets following the sow vaccination were reduction of viraemia, lesions and viral load in tissues in PCV2 systemic disease and increased piglet average daily weight gain in PCV2 subclinical infection. When this vaccination strategy is boosted in the following reproductive cycles, an improvement of the reproduction rate, number of piglets born alive, birth weight of piglets and number of piglets weaned per a litter was achieved.

In a recent study carried out by (Pleguezuelos et al.) the vaccination of gilts and sows against PCV2, at different physiological stages, mimicking a blanket schedule in a sub-clinical infection scenario, improved the immune status of dams and the progeny against the virus and reduced the virus circulation at farrowing in sows and vertical infection to foetuses. PCV2 sow vaccination also improved piglets' weight at birth and weaning and allowed reduced cross-fostering.

It's important to emphasize that PCV2 sow vaccination, even though promoting benefits for the herd, do not replace piglet vaccination around weaning. To obtain the maximum advantage of a PCV2 control program, consider vaccinating both piglets and sows

When I vaccinate my sows for a longer period can I then terminate piglet vaccination?

No, sow vaccination cannot replace piglet vaccination. Sow herd vaccination with Ingelvac CircoFLEX® will reduce the circulation of PCV2 in a herd but it will not eliminate the virus. Piglets might benefit from maternal immunity from vaccinated sows, but maternal immunity will decline during the nursery period. So, sow vaccination does not replace piglet vaccination - neither in the short or in the long term.

Could sow PCV2 vaccination increase the level of maternally derived antibodies (MDA) so much, interfering with the effectiveness of the piglet vaccination?

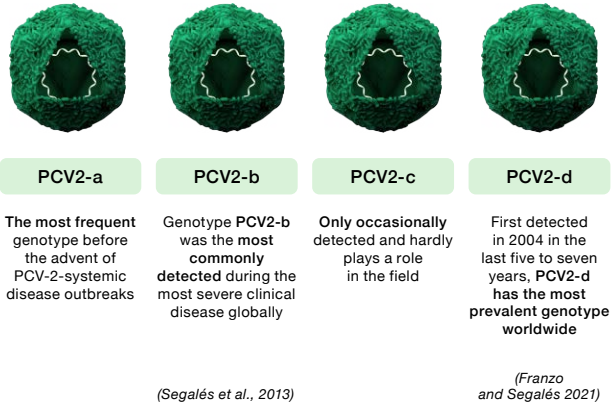
The impact of MDA on active immunisation with PCV2 vaccines in young pigs has been evaluated in different studies. It is known that high MDA titers may influence the piglet immune response to certain PCV2 vaccines, compromising their effectiveness. However, multiple studies prove that the effectiveness of Ingelvac CircoFLEX® is not impaired by the presence of high MDA values at time of vaccination. (Figueras-Gourgues et al., 2019) demonstrated that the efficacy (in terms of ADWG improvement and viraemia) of Ingelvac CircoFLEX®, when applied at 3 weeks of age, was not affected by the level of MDA at the time of vaccination.

1.5 Deep Dive – PCV2

Another study, carried out by (Feng et al., 2016) confirmed that the vaccination using Ingelvac CircoFLEX® at 3 weeks of age was able to efficiently control PCV2 infection, reduce PCV2 viral load, increase the serological response against the infection and improve ADWG.

Does Ingelvac CircoFLEX® provides protection to different PCV2 genotypes?

Graph 28. Predominant PCV2 genotypes detected globally.



Currently, there are three major PCV2 genotypes in circulation: PCV2-a, b and d. Since it was identified in 2010, PCV2-d has become the predominant genotype circulating globally.

So far, PCV2-a vaccines have shown great efficacy in reducing clinical signs associated to diseases caused by PCV2, independently of the genotype present in the farm. In a recent publication Franzo & Segalés have reviewed and summarized the available studies on PCV2 genetic heterogeneity, immunity, and vaccine efficacy. Experimental data demonstrated the cross-protection of PCV2-a vaccines against the most widespread genotypes (PCV2-a, PCV2-b, and PCV2-d). The authors concluded that, despite the significant number of genotypes described/proposed (PCV-2a to PCV2), it seems one single PCV2 serotype would exist so far.

Moreover, it has been proved in several published studies that Ingelvac CircoFLEX®, a PCV2-a-based vaccine, provides cross-protection against different PCV2 genotypes, including the most prevalent PCV2-d.

Table 15. Summary of published studies demonstrating cross protection of a PCV2-a based vaccine against the most prevalent genotypes of PCV2.

Paper	Type of study	Country	Field strain(s) challenging pigs
Licensing Data*	Lab Challenge	US,Europe	Heterologous PCV2-a
Takahagi et al, 2009	Field trial	Japan	Heterologous PCV2-a, PCV2-b
Desrosiers, 2009	Field trial	Canada	PCV2-b
Cline et al, 2008	Field trial	US	PCV2-b
Haiwick et al, 2014	Lab challenge	US	PCV2-b
Rodier et al, 2014	Lab challenge	US	PCV2-b
Opriessnig et al, 2014	Lab challenge	US	PCV2-b
Jeong et al, 2015	Field trial	Korea	PCV2-b, PCV2-d
Rose et al, 2016	Lab challenge	France	PCV2-b
Payne et al, 2016	Field trial	US	Heterologous PCV2-a, PCV2-b, PCV2-d
Huang et al, 2016	Lab challenge	China	PCV2-b
Fano et al, 2017	Farm scale challenge	US	PCV2-d
Philips et al, 2017	Farm scale PRDC challenge	US	PCV2-d
Lebret et al, 2017	Case report	France	PCV2-d
Park et al, 2019	Lab challenge	Korea	Heterologous PCV2-a, PCV2-b, PCV2-d
Friedrich et al, 2019	Lab challenge	US	PCV2-d
Romanov et al, 2020	Case report (reproductive)	Ukraine	PCV2-d
Fano et al, 2021	Farm scale challenge	US	PCV2-d

1.5 Deep Dive – PCV2

How about PCV3? Does PCV2 vaccines provide cross-protection to PCV3?

It is important to understand that PCV3, a circovirus that might be related to clinical cases (reproductive failure and wasting in piglets) should not be confused with the emergence of different strains of PCV2. PCV3 is considered a separate species which shares only 50% genetic identity with PCV2, and no cross-protection from existing PCV2 vaccines should be expected.

For how long will my pigs be protected after vaccination with Ingelvac CircoFLEX®?

Studies performed in production systems where pigs are rearing for long period (Parma ham and Iberian ham) have shown that Ingelvac CircoFLEX® can provide protective immunity against PCV2 infection for up to 10 months of age or pigs marketed to over 143kg.

Can I eradicate PCV2 from a sow farm by herd closure and mass vaccination?

In pig production, there are some examples of pathogen eradication programs based on the combination of vaccination and management strategies. Feng et al., 2014, evaluated the feasibility to eradicate PCV2 infection in a conventional farm by vaccinating both sows and piglets in a 12 consecutive month period. It was observed that the whole herd mass vaccination can reduce virus circulation to non-detectable level but once vaccination is stopped the virus reappeared, evidencing the inability to eradicate PCV2 thought mass vaccination.

References:

Pleguezuelos et al. ↗

Feng et al., 2016 ↗

Feng et al., 2014 ↗

Figueras-Gourgues et al., 2019 ↗

Franzo and Segalés 2021 ↗

Global PRRS Solutions

Boehringer Ingelheim

1.5 Deep Dive – Mhp *(Mycoplasma hyopneumoniae)*

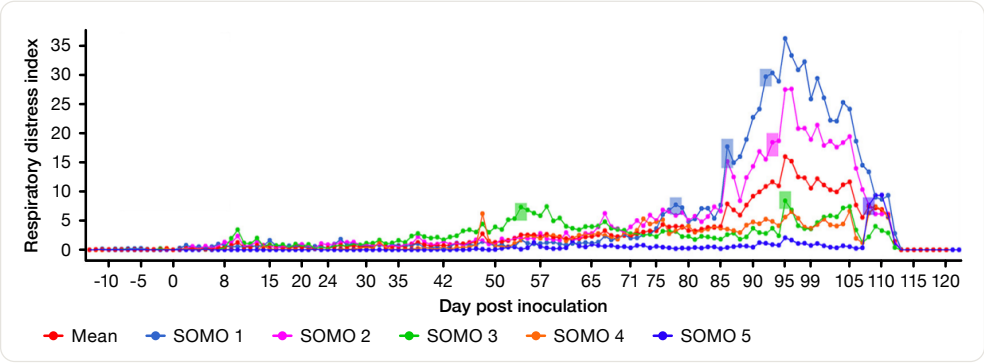
Mycoplasma hyopneumoniae (Mhp) is one of the agents of the respiratory disease complex and the cause of enzootic pneumonia in pigs. Due to its slow nose-to-nose transmission (estimated R0 of 1.16 in a 6 – week nursery period) is one of the most challenging bacterial pathogens to monitor in swine production systems. Mhp causes chronic bronchopneumonia, a nonproductive cough, reduced daily weight gain, poor feed conversion, causing very high economic losses. Since one of the highest-risk events for a swine production system is the introduction of replacement animals into a herd, the adaptation to Mhp and, consecutively surveillance of pathogen colonization and clinical signs, is key for optimal production performance in the gilt pool and in the sow herd.

Mhp clinical signs surveillance in negative groups:

Mhp surveillance may be done using various sampling strategies (i.e. oral fluids, serum, deep tracheal swabs) and testing protocols (i.e. ELISA for antibodies, PCR for DNA detection). In a field Mhp seeder study (Clavijo *MJ et al., 2021*), SoundTalks® technology was used to monitor respiratory clinical signs in a Mhp and PRRS negative group of pigs. The primary objective of the study was to estimate the probability of Mhp detection in tracheal samples (DNA), oral fluids (DNA), and sera (antibodies) as a function of Mhp prevalence and sample size while monitoring with 5 SoundTalks® sensors (SOMO 1 – 5 previous SoundTalks® version) along the tunnel ventilated room.

Results from the clinical surveillance part of this study are shown in *(Graph 14)*. Respiratory Health Status is represented by the old metric RDI (Respiratory Disease Index). The first SoundTalks® alert was recorded on day post infection (DPI) 55 by the closest sensor, located in the center of the room nearest to the inoculated pen. On DPI 78, SOMO 1, located at the north end of the barn recorded another alert. Both SOMO 1 and 2, set up on the north end of the room and the closest to the air outlet, recorded the next two alerts on DPI 86, demonstrating the importance of the airborne route when considering the epidemiology of the disease. The highest average values (highest respiratory distress level) across all SOMO devices were recorded on DPI 95, which coincided with the highest detection of positive pens by oral fluid samples. In total, 8 RDI alerts were recorded throughout the study. Results from this study demonstrate that SoundTalks® is a reliable tool to monitor Mhp respiratory clinical signs in the face of an acute outbreak as represented under this study conditions.

Graph 29. SoundTalks® metric (Respiratory distress index (RDI)) by monitor (SOMO 1 – 5). Colored rectangles represent SoundTalks® alerts (increased respiratory clinical signs in the room).



Clavijo *MJ et al., 2021* ↗

1.5 Deep Dive – Mhp *(Mycoplasma hyopneumoniae)*

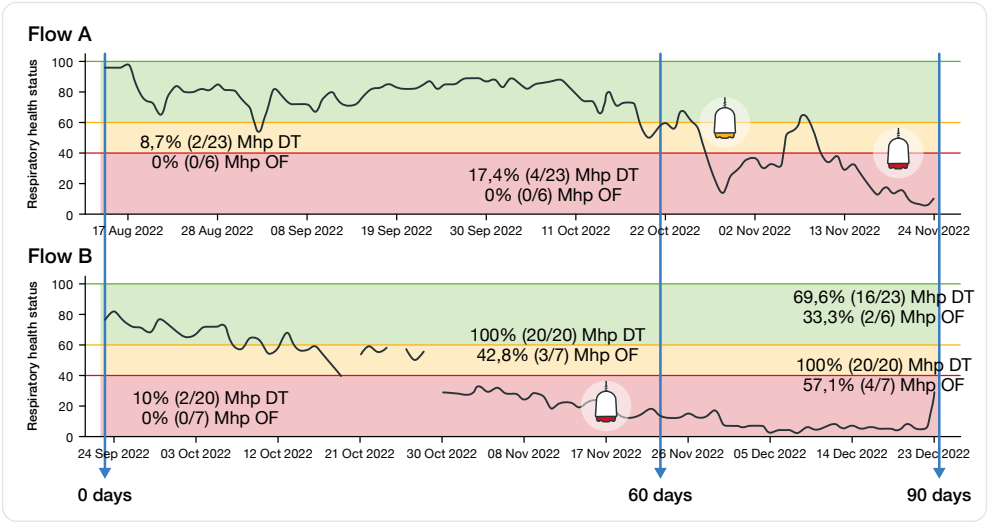
Mhp clinical signs surveillance in positive groups:

Mph endemic populations of finishing pigs have also been sound monitored using SoundTalks® and results correlated to disease prevalence and disease spread pattern (*De Conti et al.*, personal communication). In this longitudinal study, 2 groups of pigs (n= 1000 pigs/barn 1 or n= 1350 pigs/barn 2) coming from different PRRS negative sow flows were sound monitored by SoundTalks® (6 monitors/ barn 1 or 7 monitors/barn 2). (Diagnostic samples were taken at 0 – 60 – 90 days post finishing placement and included 7 oral fluids (one under each monitored) and 20 deep tracheal swabs from tagged piglets followed overtime. Samples were run by PCR for Mhp and Influenza A virus at the end of the study.

Results from flow A and B are shown in *(Graph 15)*. Both finishing batch periods showed a typical Mhp ReHS pattern: gentle but constant declining slope of the ReHS representing the slow transmission rate of the pathogen. Pigs from flow B show a later pattern (2 months after placement) compared to pigs from flow A (immediately after placement).

Despite starting with similar Mph prevalence measured as % of positive deep tracheal swabs (8.7% for flow A and 10% for flow B), pigs from flow A had significantly lower prevalence during the first 60 days post placement compared to flow B and that translated in a lower % of days in alarm (yellow or red) also in flow A compared to flow B *(Graph 15)*.

Graph 30. Respiratory clinical signs monitored by SoundTalks® and diagnosed by oral fluids (OF) and deep tracheal swab (DT).



Crack the Case

A previously PRRSv-stable (consistently weaning PRRSv-negative pigs) 6,000 Breeding herd broke with a Lineage 1 RFLP 1-4-4 PRRSv Type 2 (week 0).

Help the producer with a strategic PRRS control approach to decide on sample size and actions to be taken to reach stability again.

Question:

There was a significant ‘parity 2 dip’ in farrowing rate, total born, and born alive, indicating a reproductive problem with the gilts.

How would you investigate the problem?

A

Compare PRRSv detection rate in stillborn tongue tip fluids from gilt litters to that of older parity females: the parity 1 offspring will be the last one to turn negative in Stable herds.

B

Check incoming gilts’ oral fluids for PRRSv by PCR. Results should be negative by PCR, and positive by ELISA when gilts were previously vaccinated. Occasional high-CT positivity should be sequenced to confirm MLV-like, ruling out wild-type virus.

C

Build strong herd immunity: for endemic herds, vaccinate gilts at the time of weaning. Provide at least another full dose upon final selection for reproduction, at around 150 days.

Answer:

How would you investigate the problem?

A, B, and C are correct!
There is no ‘silver bullet’ for PRRSv control – successful strategies often combine different layers of immunization, unidirectional pig flow, and monitoring.

Results:

Virus characterization

Productivity: there was a significant 'parity 2 dip' in farrowing rate, total born, and born alive, indicating a reproductive problem with the gilts.

Diagnostics: On weekly monitoring of processing fluids, the PRRSv PCR positivity was 20% higher in pigs from parity 1, females than pigs from older sows.

Conclusion and take-home actions:

Conclusion: The acclimation process should be revised to better prepare gilts and their offspring for endemic PRRSv-1 circulating in the farm.

Actions taken:

- All weaning pigs will receive a full dose of MLV.
- In the nursery, candidate gilts will be identified (heavy, sound legs, good body conformation, healthy) and segregated in a dedicated pen. This will be done in every nursery room.
- At the end of the nursery, non-select gilts will be transferred to the finishing unit. Select gilts will receive another MLV shot. A dedicated employee will care for the gilt pool, defined as the gilt development unit (GDU). This employee will not do chores in other barns of the farm. He will be dedicated to gilt development and acclimation processes.
- 4 – 5 weeks before moving the gilts to the gestation barn (upon heat detection), they will receive another MLV booster.

Results:

- The retention rate of gilts to Parity 3 increased by ten percentage points.
- There was no more parity 2 – dip.
- The whole herd reached PRRSv stabilization, and mortalities returned to the expected baseline.

1.6 Appendix

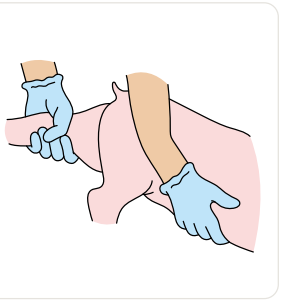
1.6 How to restrain a pig

Adapted form www.securepork.org

Piglet bleeding restraint instructions:

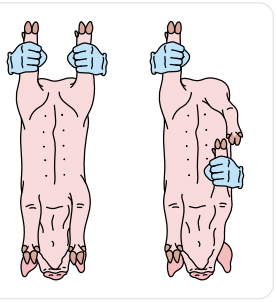
Step 1

Grasp upper back leg, above hock. For bigger piglets, place the hand under animal's belly.



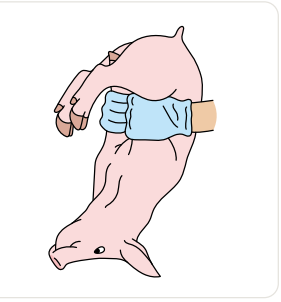
Step 2

Lift piglet up to rest on your chest. Use other hand to grab opposite front leg of piglet.



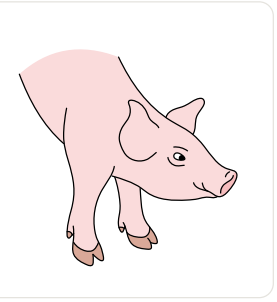
Step 3

Switch grip from back leg to second front leg. Collect sample.



Step 4

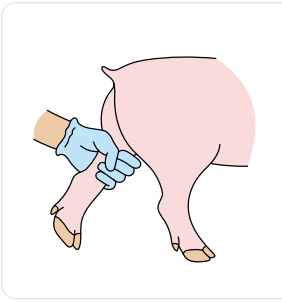
Ensure 2 points of contact before release.



Piglet restraint instructions:

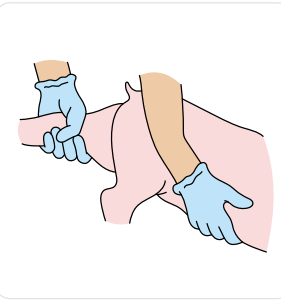
Step 1

Grasp upper back leg, above hock.



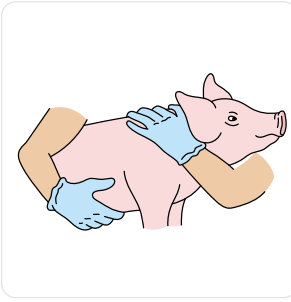
Step 2

Place other hand under animal's belly and lift to your chest.



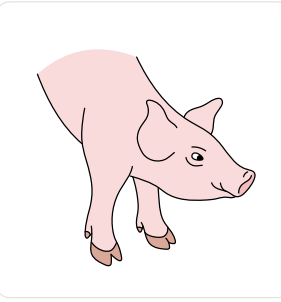
Step 3

Continue holding animal under the belly and wrap other arm around pig's neck. Collect sample.



Step 4

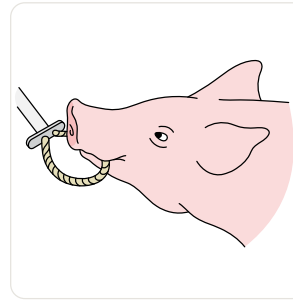
Ensure 2 points of contact before release.



Piglet restraint instructions:

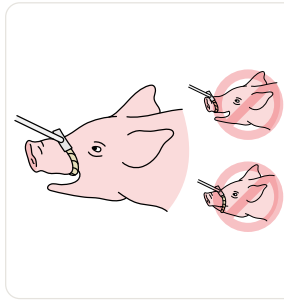
Step 1

Stick end of snare out, allowing pig to chew.



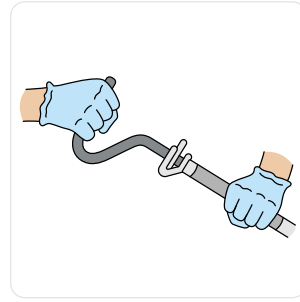
Step 2

Ensure snare is as far back on the snout as possible and not around bottom jaw.



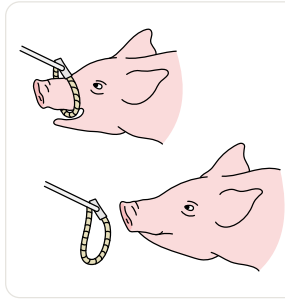
Step 3

When ready, pull snare handle back to tighten loop around pig's snout. Collect sample.



Step 4

Release the snare and free the animal.

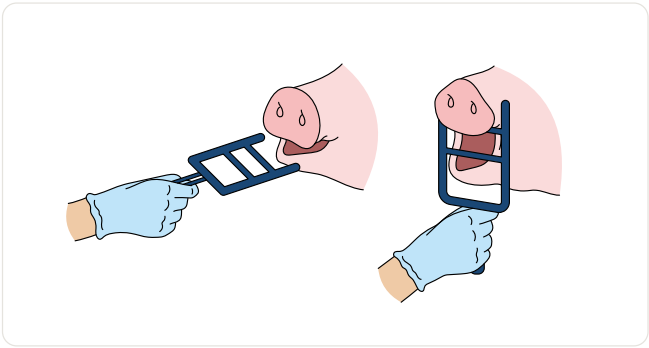


1.6 How to collect deep tracheal swabs

Adapted form www.securepork.org

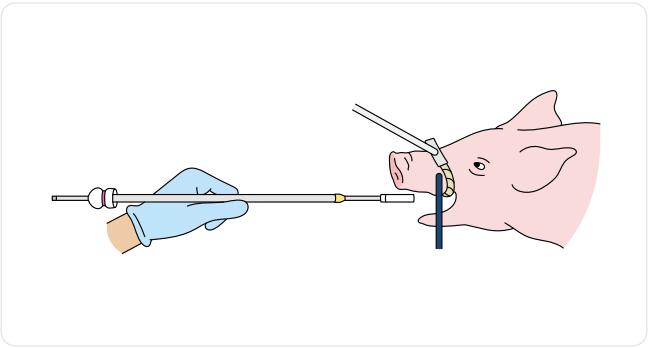
Step 1

Place the oral speculum inside the oral cavity and open the mouth.



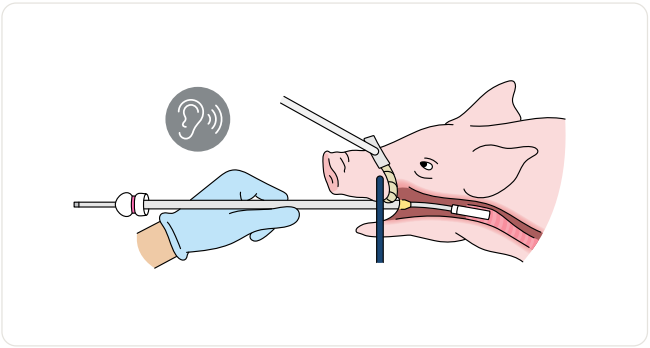
Step 2

Confirm oral cavity visibility. Gently insert the bag end of the PCAI rod into the mouth.



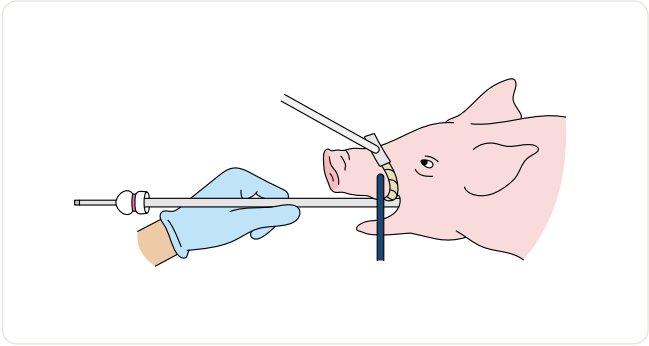
Step 3

Listen for a change in vocalization when advancing the rod. This indicates the vocal chords have been passed and rod is at entrance of the trachea.



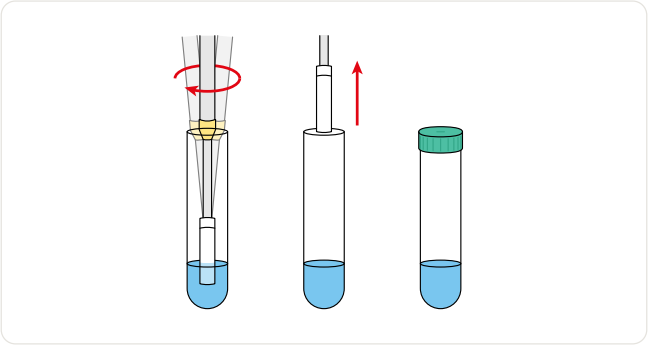
Step 4

Gently move the rod back and forth inside the trachea. Quickly remove rod and speculum and release the pig.



Step 5

Put rod into snap cap tube. Vigorously swirl rod and remove. Promptly chill samples for shipment

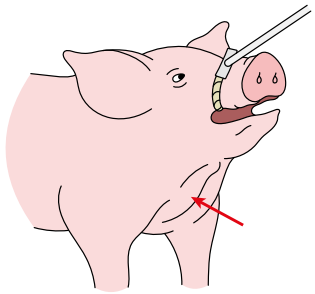


1.6 How to collect serum samples

Adapted form www.securepork.org

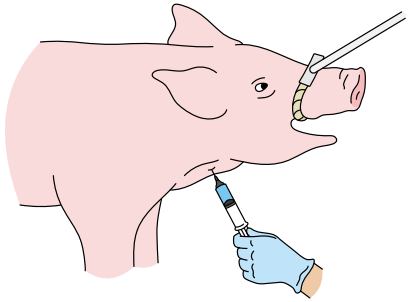
Step 1

Collect blood from jugular groove with a blind stick, starting on the pig's right side preferably.



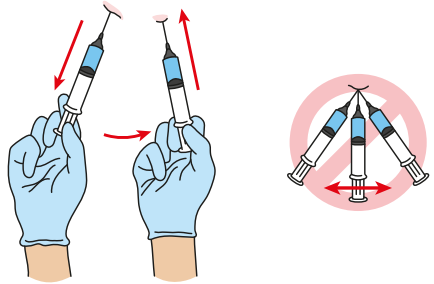
Step 2

Ensure needle is perpendicular to the skin.
The deepest part of the jugular groove is the entry point.



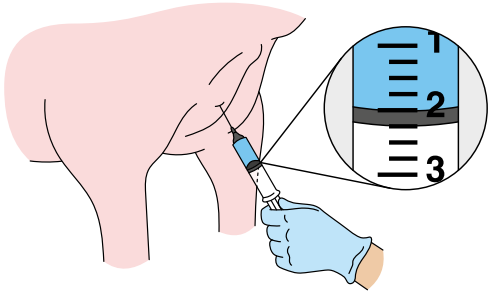
Step 3

Adjust needle angle and depth until blood flows.
To reposition, pull back, adjust angle, increase or decrease depth.



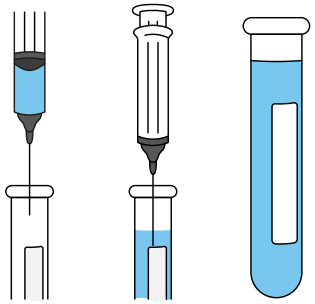
Step 4

Once blood is flowing, collect a minimum of 2 ml.
For future reference, note the position and depth before removing the needle.



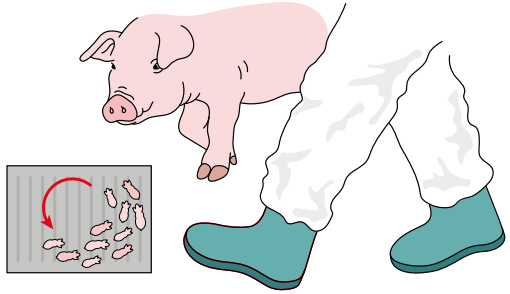
Step 5

Transfer blood from syringe to blood tube.



Step 6

Check animals in pen to confirm normal activity when bleeding is complete. Promptly chill samples for shipment.



Global PRRS Solutions

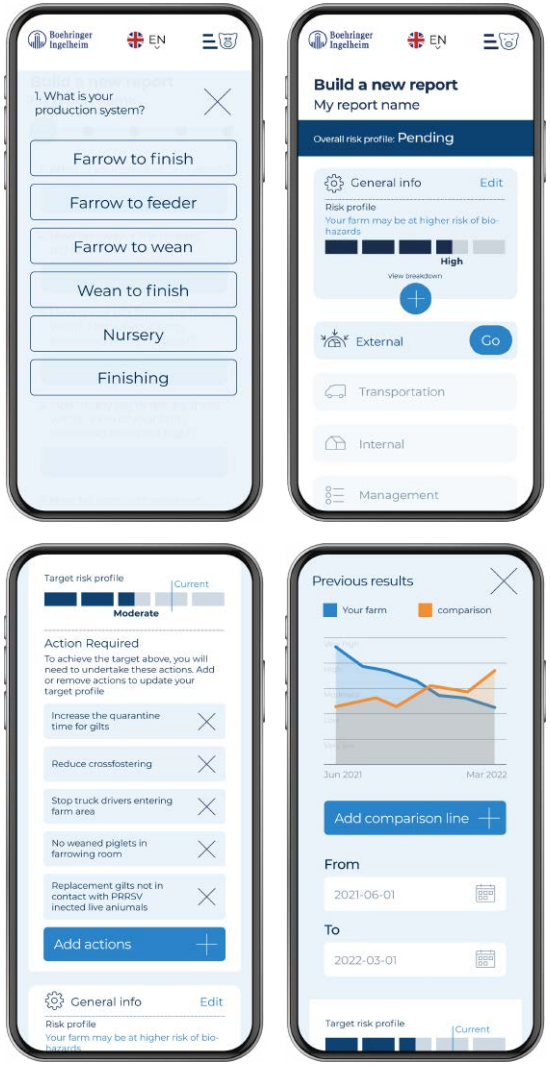
Boehringer Ingelheim

1.6 COMBAT is...

a free web based application will help to check and improve you PRRSv-related biosecurity by highlighting practices and procedures that can be reinforced.

It provides:

COMBAT



1

Specific assessments

By selecting your production system, only relevant questions will be shown.

2

Immediate results

While conducting the assessment, get immediate results after each section (General, External, Transportation, Internal, Management)

3

Actionable recommendations

A list of individual suggestions will help you to prioritize the actions to improve your biosecurity. Observe how your risk profile changes according to your selected actions.

4

Individual benchmarking

Evaluate your farm over time and compare to your own production system or to average country data.

Get the tool here

Global PRRS Solutions

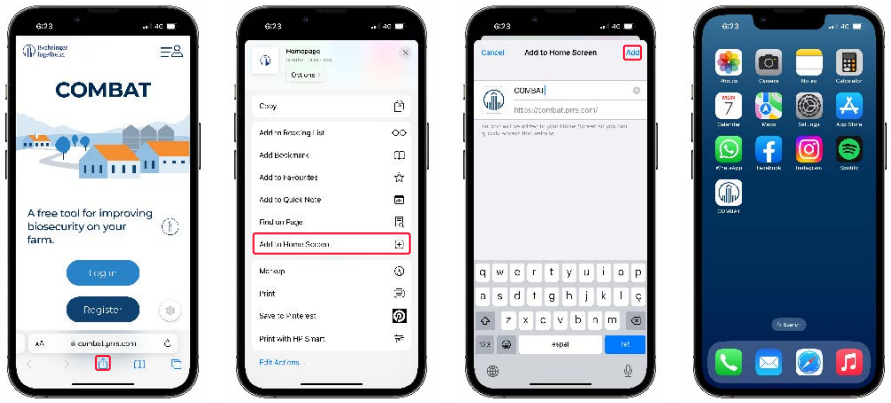
Boehringer Ingelheim

Combat as a home screen bookmark

iOS

1. Launch **Safari** on your iPhone.
2. Navigate to “combat.prrs.com”.
3. Tap the **Share** icon (the square with an arrow pointing out of it) at the bottom of the screen.
4. Scroll down to the list of actions and tap **“Add to Home Screen”**.
   *(If you don’t see the action, scroll to the bottom and tap **“Edit Actions”**, then tap **“Add”** next to the **“Add to Home Screen action”**. After that, you’ll be able to select it from the Share Sheet).*
5. Type a name for the site link (COMBAT).
   This will be the title that appears beneath its icon on your Home screen.
6. Tap **“Add”** in the top-right corner of the screen.

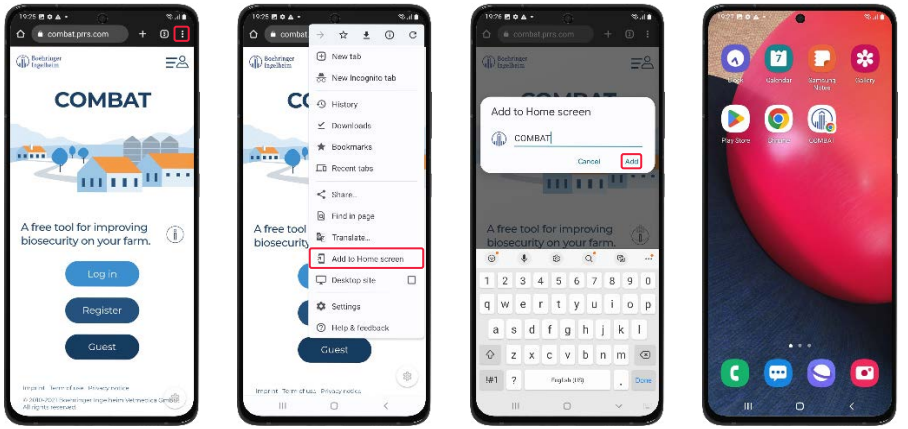
Your new “web app” will appear in the next available space on your device’s Home screen.



Android

1. Launch **Chome**.
2. Navigate to “combat.prrs.com”.
3. Tap the **three-dot menu** on the top-right corner.
4. Tap **“Add to Home Screen”**.
   It’s toward the bottom of the menu, so you may have to scroll down to see it. A pop-up window will appear.
5. Type a name for the site link (COMBAT).
   This will be the title that appears beneath its icon on your Home screen.
6. Tap **“Add”**.

Your new “web app” will appear in the next available space on your device’s Home screen.



Global PRRS Solutions

Boehringer Ingelheim

1.7 Glossary

1. Difference between gilt development & gilt acclimation:

- **Development,** refers to proper growth, selection, and proper preparation to the reproductive life. It includes selection criteria, allowing proper space, ventilation, and access to feed and water. It also covers aspects of reproduction including timing and strategies to stimulate puberty.

- **Acclimation,** refers to building immunity to pathogens affecting the breeding herd or the downstream grow-finish herd. Following a proper immunization, gilt acclimation procedures should also ensure the lack of shedding for most economically significant pathogens, and allow proper infrastructure to prevent unintended transmission of pathogens into the gilt isolation facility (i.e., quarantine building) or from the gilt isolation facility to the breeding herd. Strategies to effectively monitor the gilt population to pathogen activity are also of key importance for compliance, biocontainment, and biosecurity purposes.

- **Gilt development,** is to ensure good reproductive performance during the female's lifetime.

- **Gilt acclimation,** is to preserve and improve the breeding herd's health status, ensuring pigs reach the top of their genetic potential. This material will focus on the latter, compiling information to guide swine veterinarians and producers to maximize the health status of their herds.

It is well established that the breeding herd's health status is largely dependent upon the gilt's level of immunity and shedding.

Parity 1 litters are at higher risk of infection, shedding, and transmission of endemic pathogens in the herd. Thus, the better gilt acclimation procedures are implemented, the lesser will be the 'gap' between P1 and P2+ sows, reducing losses attributed to endemic pathogens and improving whole-herd productivity.

2. Gilt development unit (GDU): a facility such as a barn to provide adequate space and access to water and feed. It can be **used for gilt development as well as for gilt acclimation** purposes.

- **On site:** when the GDU is on the same farm as the breeding herd receiving the gilts. It may be attached to the breeding herd's buildings, or have a dedicated site.

- **Off site:** when the GDU is located on another farm, needing to be transported to the breeding herd, before or after breeding.

2.1. Gilt replacement

- **Internal:** when gilts were born in the same farm where they will join the breeding herd. For biosecurity purposes it is a safer option than external replacement. The term 'closed herd' is referred to those using internal gilt replacement. In such cases the genetic improvement happens via semen from boars of high genetic value.

- **External:** when gilts are obtained from another breeding herd located in a different site from the recipient herd.

2.2. Herd closure: refers to the practice of temporarily interrupting gilt introduction into the breeding herd. It is a common practice in PRRS virus and *Mycoplasma hyopneumoniae* control & elimination programs. In such cases, gilt introduction resumes when there is enough diagnostic evidence of lack of shedding of the target pathogens in the breeding herd.

2.3. Quarantine: this term has 2 different meanings, depending on the context:

- **As a noun:** also referred to as 'isolation unit', refers to a place, typically a barn, used to maintain gilts isolated from other pig populations. Typically selected pathogen activity is monitored in quarantined gilt populations. Clinical monitoring is done watching clinical signs, behaviour, water and feed disappearance. Diagnostic monitoring may also be implemented using PCR, ELISA, or other appropriate tests depending on the pathogen and desired goal.

- **As a verb:** refers to the process of placing the gilts in isolation (i.e., a quarantine barn). It is particularly important in high-health breeding herds. For instance, gilts from a supposedly negative PRRSv-negative source are placed in quarantine near, but isolated from the recipient PRRSv-naïve breeding herd. Gilts are then diagnostically tested upon arrival and before introduction into the herd, ensuring their negative status.

Life Forward