EpiX Analytics ASF project in Vietnam: "EpiX ASF Risk"

Webinar series: Optimization of testing strategy for ASF on-farm surveillance

April 28, 2020

EPIχ ANALYTICS

Zoom webinar settings / instructions

- Cameras are turned off to save bandwidth
- All participants are muted by default, but questions are allowed during the presentation:
  - Raise your hand (using the hand icon at bottom center of the Zoom screen), and we will unmute you so that you can share your question
  - If you see that someone has raised their hand and you also have a question, please wait for the first question to be answered before raising your hand
- Note that we will also have a Q&A session at the end of the webinar
- We are recording the webinar and share the link to access it afterwards

Key team members

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Webinar 4: On-farm surveillance

- Refresher
  - Partitioning concept
  - What we learnt: surveillance, test performance and interpretation, sample size calculation
- Today:
  - Reminder: importance of clinical monitoring
  - Additional value of testing
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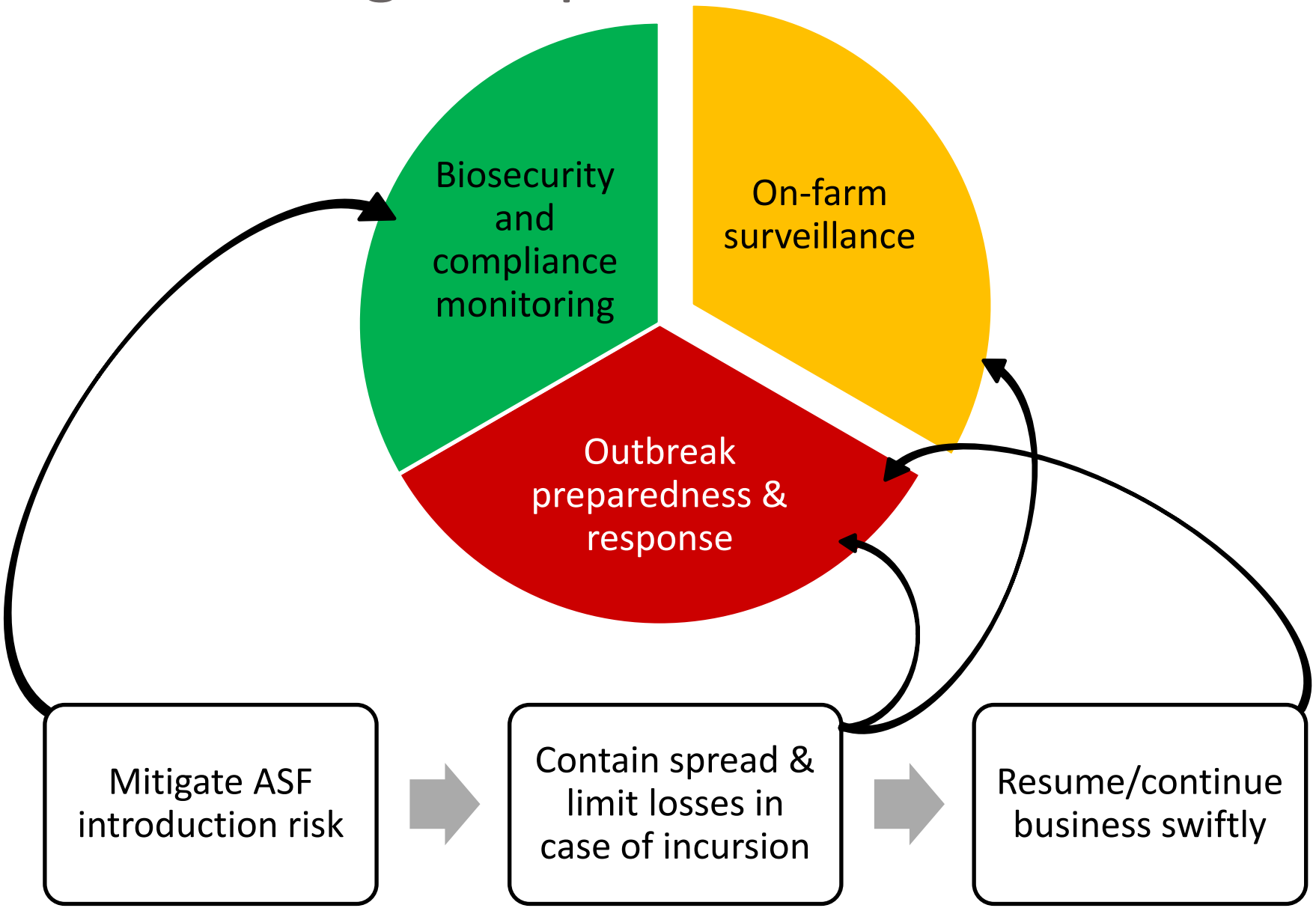
Partitioning components



Webinar 4: On-farm surveillance

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ASF: Clinical surveillance and post-mortem findings

Andres Perez

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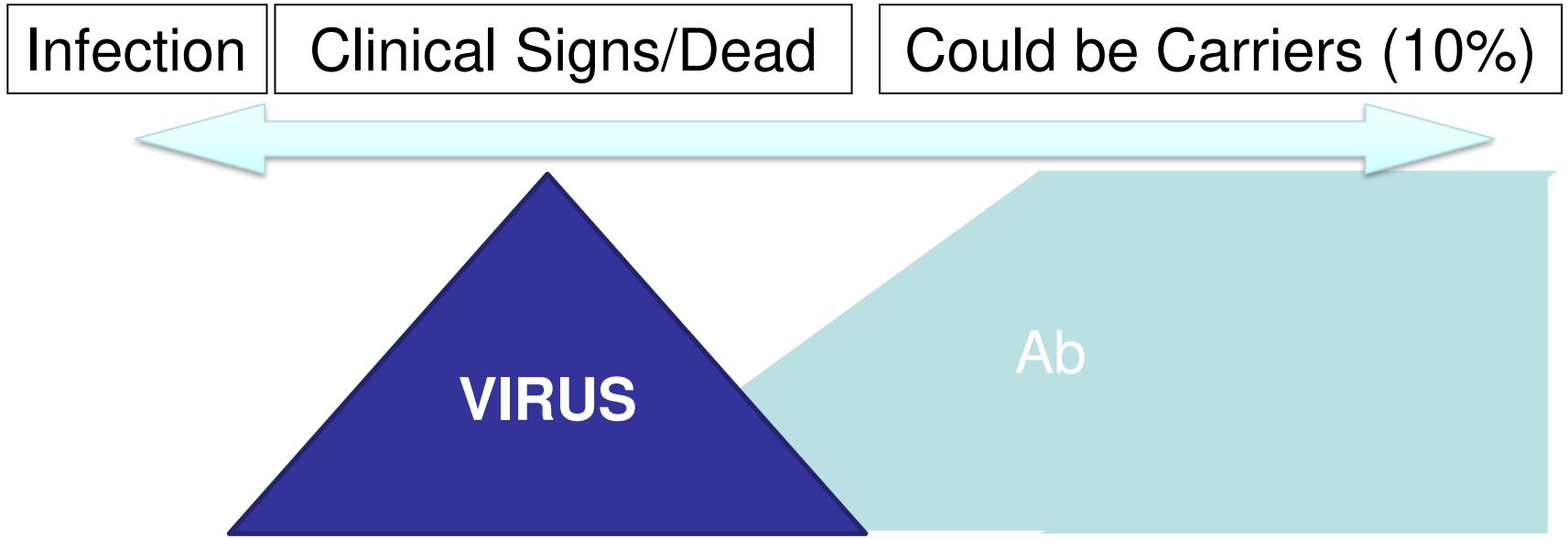
EpiX Webinar Series. April 2020

Acknowledgment

Jose Manuel Sanchez-Vizcaino, VISAVET Spain

Incubation

- Incubation period: 4-19 days



Clinical disease

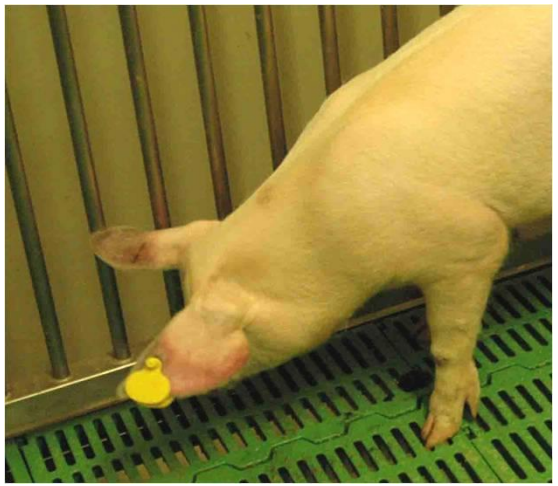
- Variety of clinical signs and lesions (virus, dose, route of infection)
  - Peracute (sudden death 1-4 days p.i., high mortality)
  - Acute (death 3-8 days p.i)
  - Subacute (mortality 30-70%)
  - Chronic and subclinical (endemic areas)

CLINICAL SIGNS

Very similar to other **hemorraghic diseases**

Clinical signs:

- Anorexia, fever
- Red skin, cianosis
- Mortality increase



Swine haemorraghic diseases:

- African swine fever
- Classical swine fever
- Actinobacillosis
- Salmonellosis
- Erisipelas
- Other Septicemic conditions
- PDNS

Easy to be confused !!!

POST-MORTEM STUDIES

PATHOLOGICAL FINDING WITH ARMENIA 07 IN WB

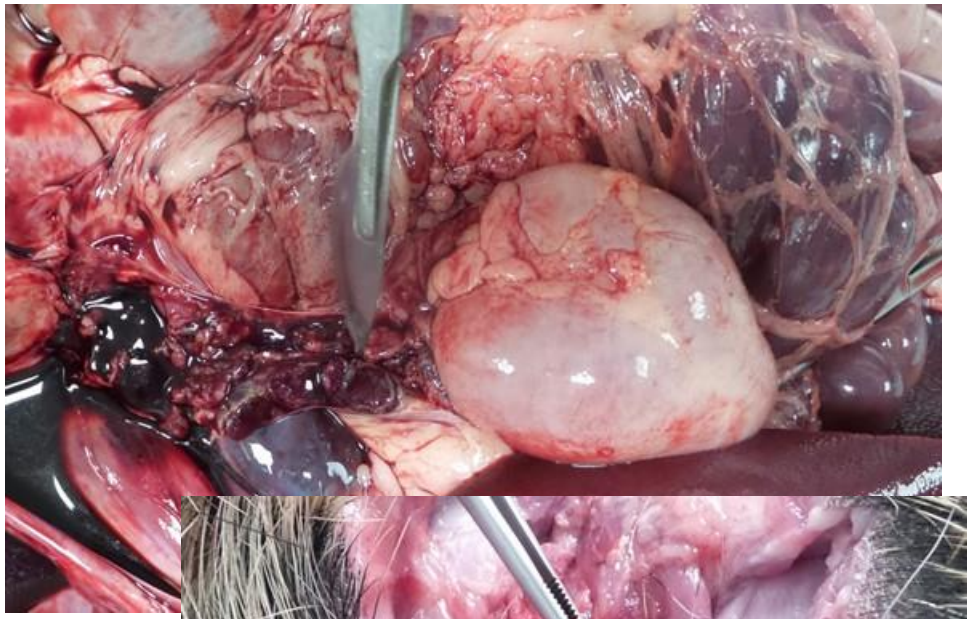
Tissue	Pathological finding	Percentage of affected animals
Spleen	Splenomegaly	100%
Lymph nodes	Lymphoadenomegaly	94.12%
	Hemorrhagic lymphadenitis	88.23%
Pleura	Hydrotorax	88.23%
Tonsils	Tonsillar hyperemia	88.23%
	Purulent tonsillitis	52.94%
Liver	Hepatomegaly	88.23%
Lung	Shock lung	70.59%
	Bronchiolointerstitial pneumonia	64.7%
Heart	Hydropericardias	70.59%
	Hemorrhages	47%
Intestine	Hemorrhages	76.47%
	Necrotic Peyer's patch	35.29%
Kidney	Hemorrhages	41.17%

Infection by Armenia/07 strain resulted in 100% lethality wild boar (total= 17) in both intramuscular infected (6) and in contact animals (11)

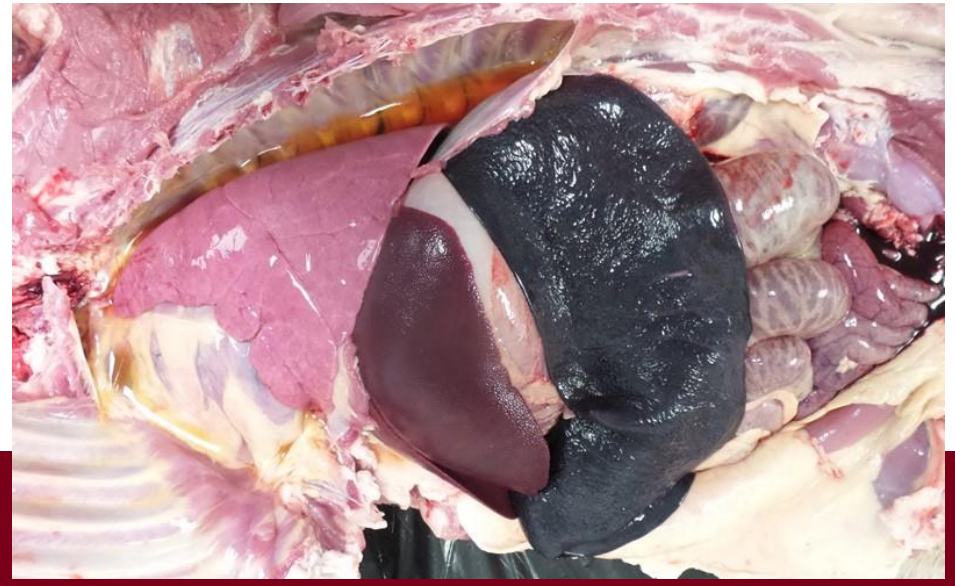
Splenomegaly
100%

Lymphoadenomegaly

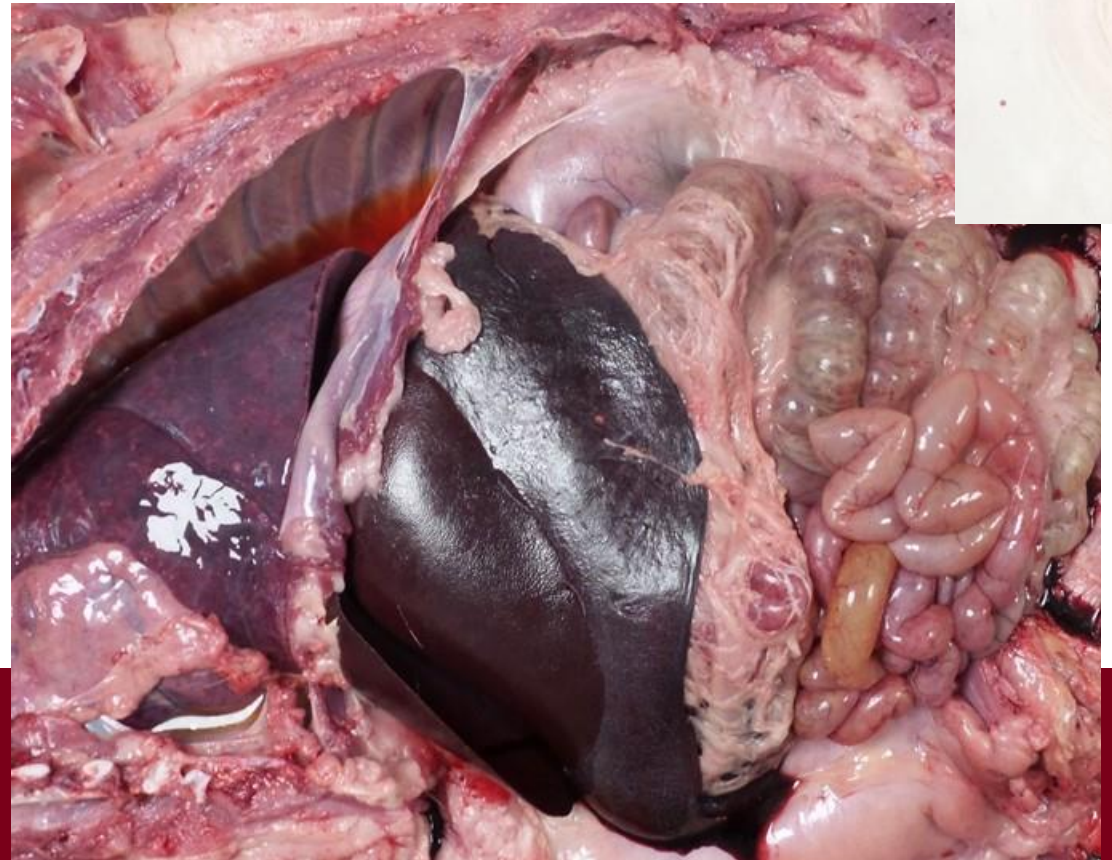
94,12%

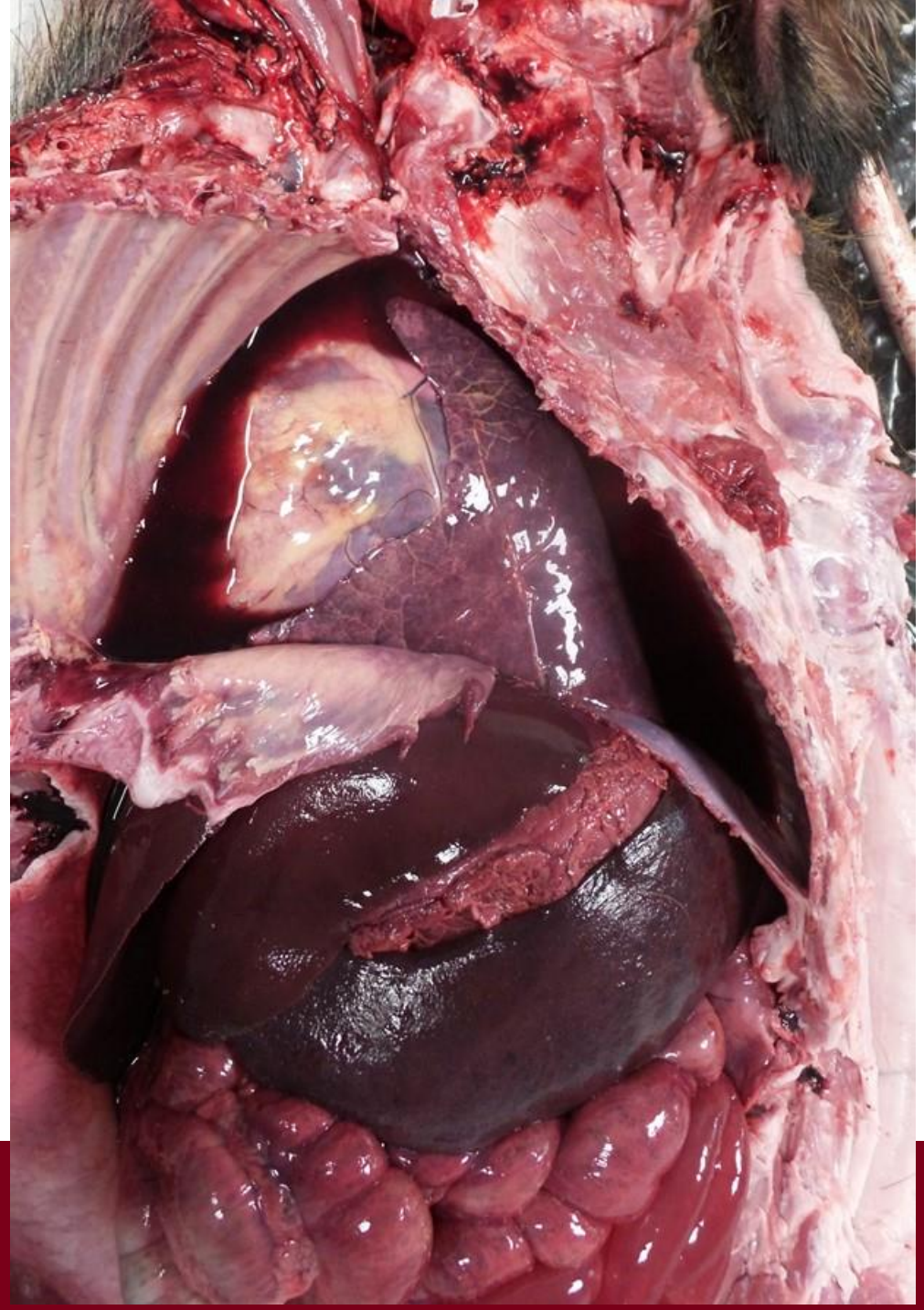


Hydrotorax
88,23



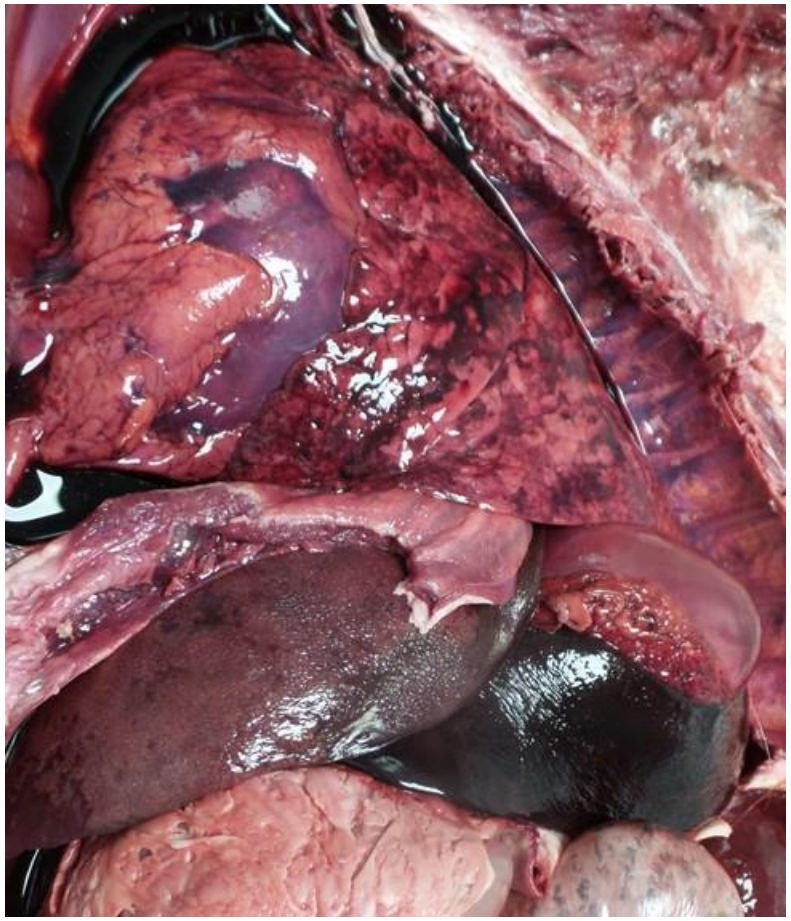
Hepatomegaly
88,23%





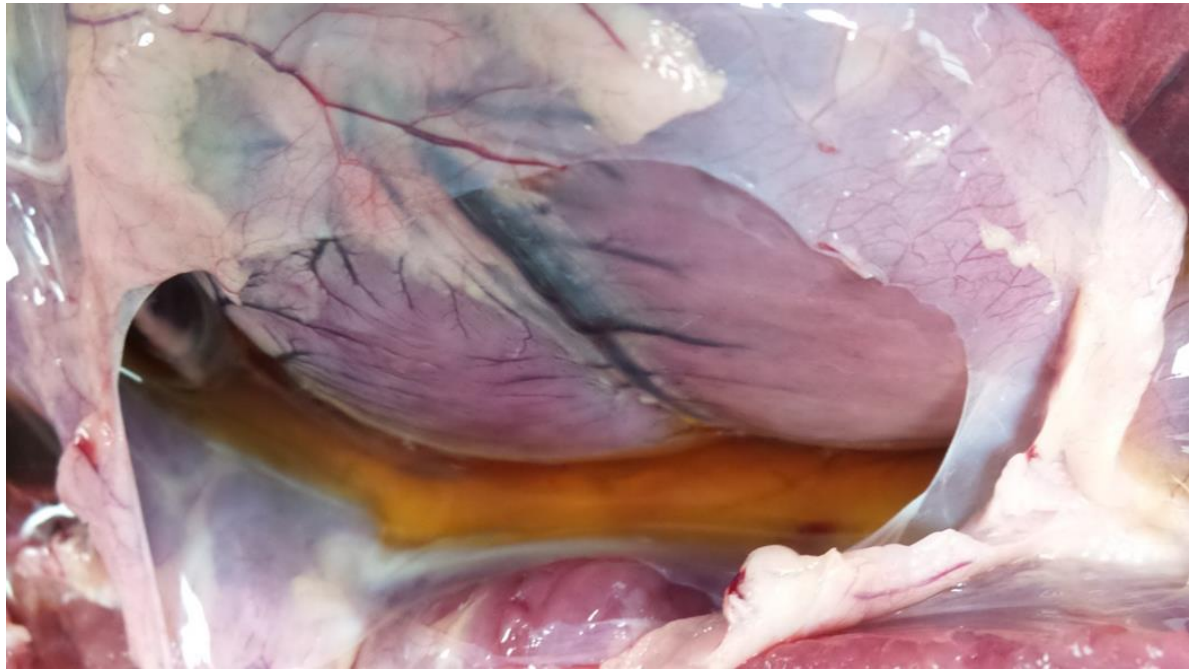
Shock lung

70,59%



Hydropericardias

70,59%



INTESTINE
Hemorrhages

76,47%

Kidney hemorrhagic 41,17%

SAMPLE COLLECTION

- **If dead or moribund pigs are detected** in a suspected holding, post-mortem examinations must be carried out, preferably on **at least five of these pigs** and in particular on pigs that have:
  - shown very evident signs of disease before death,
  - high fever,
  - died recently.
- **If not lesions suggesting ASF** but, due to the epidemiological situation, further investigations are deemed necessary:
  - a clinical examination, and blood sampling must be carried

  out in the subunit where the dead or moribund pigs were kept,
  - and post-mortem examinations may be carried on three to four in-contact pigs, particularly if these pigs are showing clinical signs.

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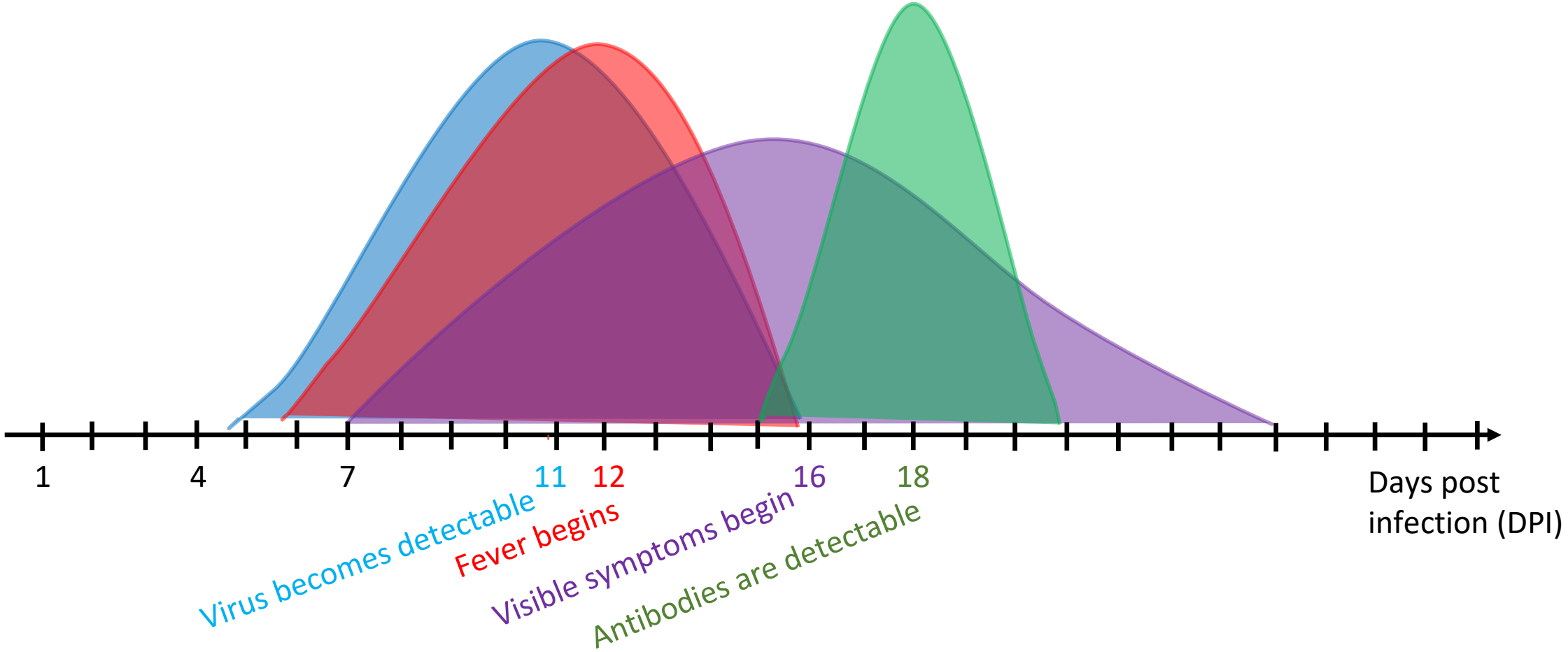
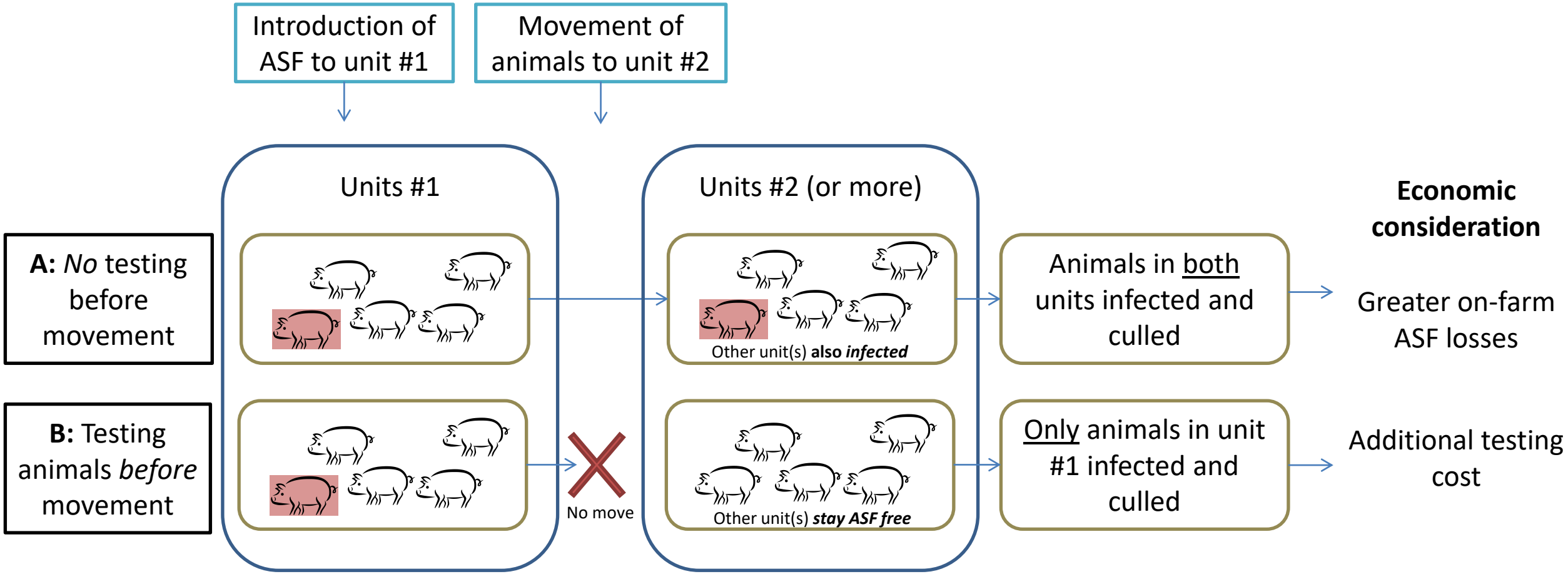
Test window opportunity

ASFV detectable a bit before symptoms start



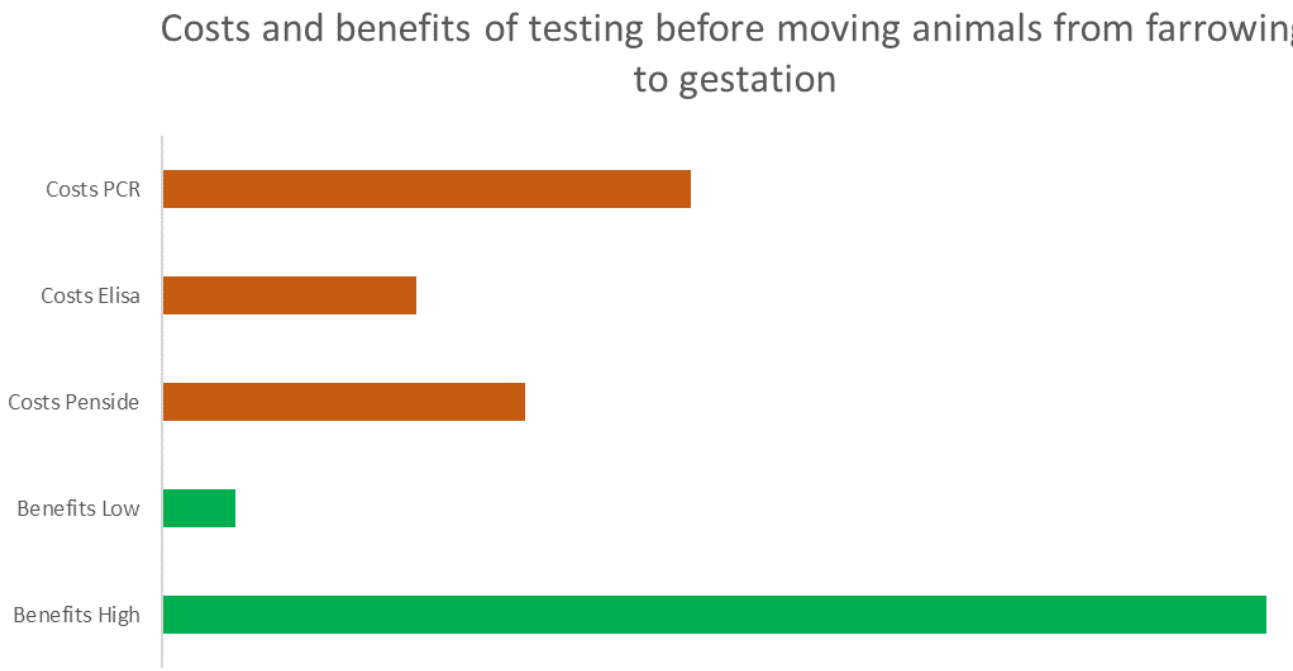
Incremental value of on-farm ASF testing over clinical monitoring only



Important that in both scenario A and B, monitoring of clinical signs is done regularly

An illustrative example*

- Weekly movement of sows from farrowing to gestation unit
  1. Worthwhile testing animals to increase the confidence of detecting ASF?
  2. What test should we consider using?



Costs are driven by # of animals tested, tests cost, false positive test results, and delays in moving animals following false-positives

Benefits are driven by, among others, probability of ASF introduction, value of animals in 'destination unit', value of continued business, test sensitivity, and test results speed

** Results shown are for illustration only and should not be relied on for decision making.*

Factors that drive the economic value of testing*?

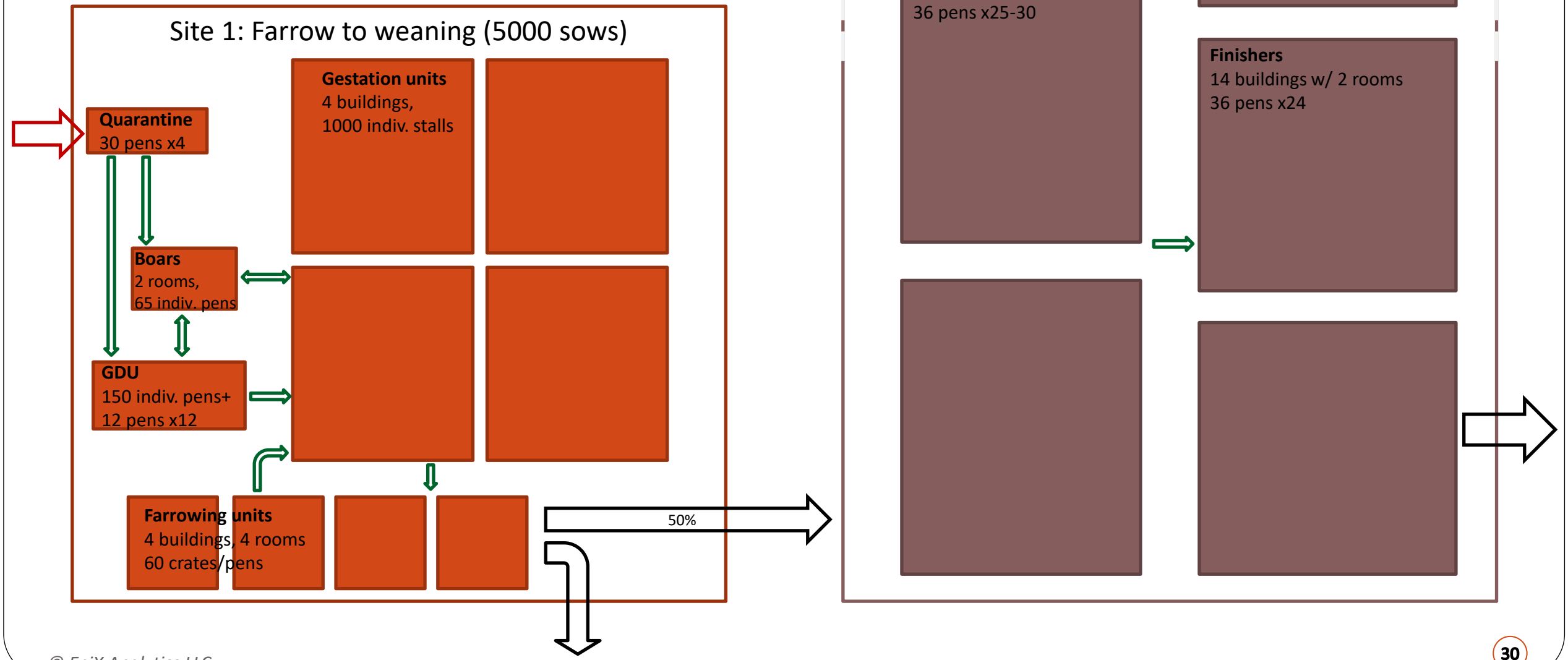
- Disease/epidemiologic factors:
  - Infectious period without clinical signs: The longer this period, the higher the value of the additional testing (i.e. *additional* value of the test beyond clinical monitoring) .
  - Expected frequency of ASF infection in the farm: The higher this frequency, the higher the value of the additional testing.
- Testing regime and test characteristics **:
  - Sensitivity: The higher the sensitivity, the higher the value of the additional testing
  - Specificity: The higher the specificity, the higher the value of the additional testing. In case that the specificity is low, many false-positive will cause additional costs to the producer (more testing, interruption of operations), and therefore make testing less attractive
  - Speed of obtaining test results: The quicker the test results, the closer the test can be used to the actual movement date/time, and therefore the more value of the testing
  - Acting on positive test results: The value of testing is also conditional on management ability and/or willingness to quickly act on the test results (i.e. culling, disinfection, wait with movement of animals before confirmatory testing, continue to monitor of signs)
- Farm-economic considerations:
  - Value of animals in unit #2: the greater the value of animals in unit #2 (e.g. pregnant breeding sows), and the greater the value of continuing production (i.e. no interruption of production, no loss of animals in a production stage that takes time to reach), the greater the value of testing
  - Costs of the test: The greater the costs of the test, the less attractive the costs of additional testing
  - Compensation by gov't: The greater (and faster) the reimbursement of the gov't is for losses caused by ASF, the less value there is in additional on-farm testing
  - Regulatory issues: The greater the confidence that the authorities would allow continuing operations i.e. no culling of animals on the same farm but in different units that can be proven free of ASF, the higher the value of additional testing.

** Determining the relative importance of the various factors above would require a full and rigorous farm-economic analysis ('in progress')*

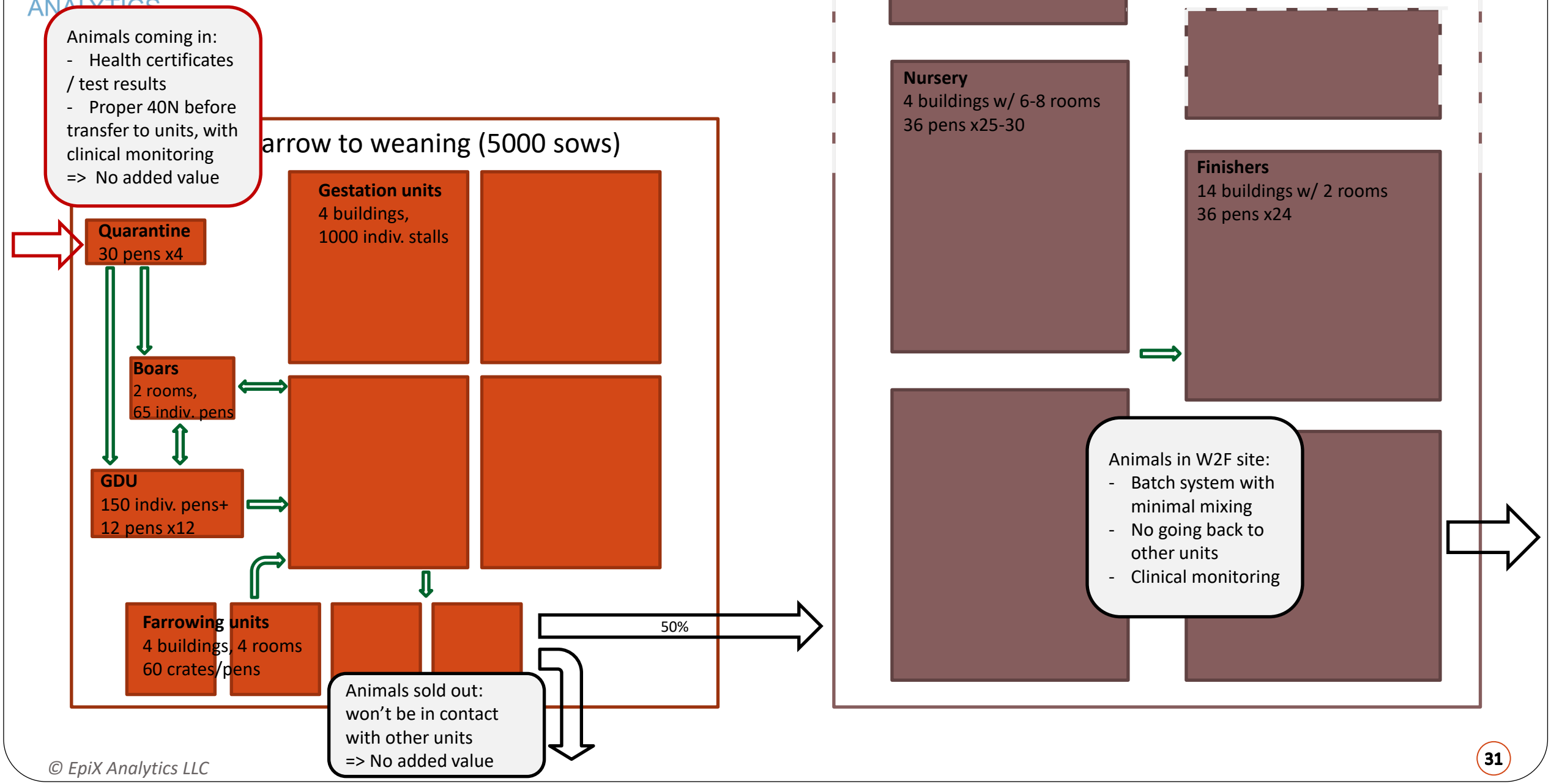
*** Using an optimal testing scheme (that also considered costs and speed of the various tests) could also help increase the value of additional testing*

Example - F2F farm: Biosecurity

SOPs & compliance checks, daily clinical monitoring in all units. Objective of testing: early detection to prevent spread to other units within farm



Example:



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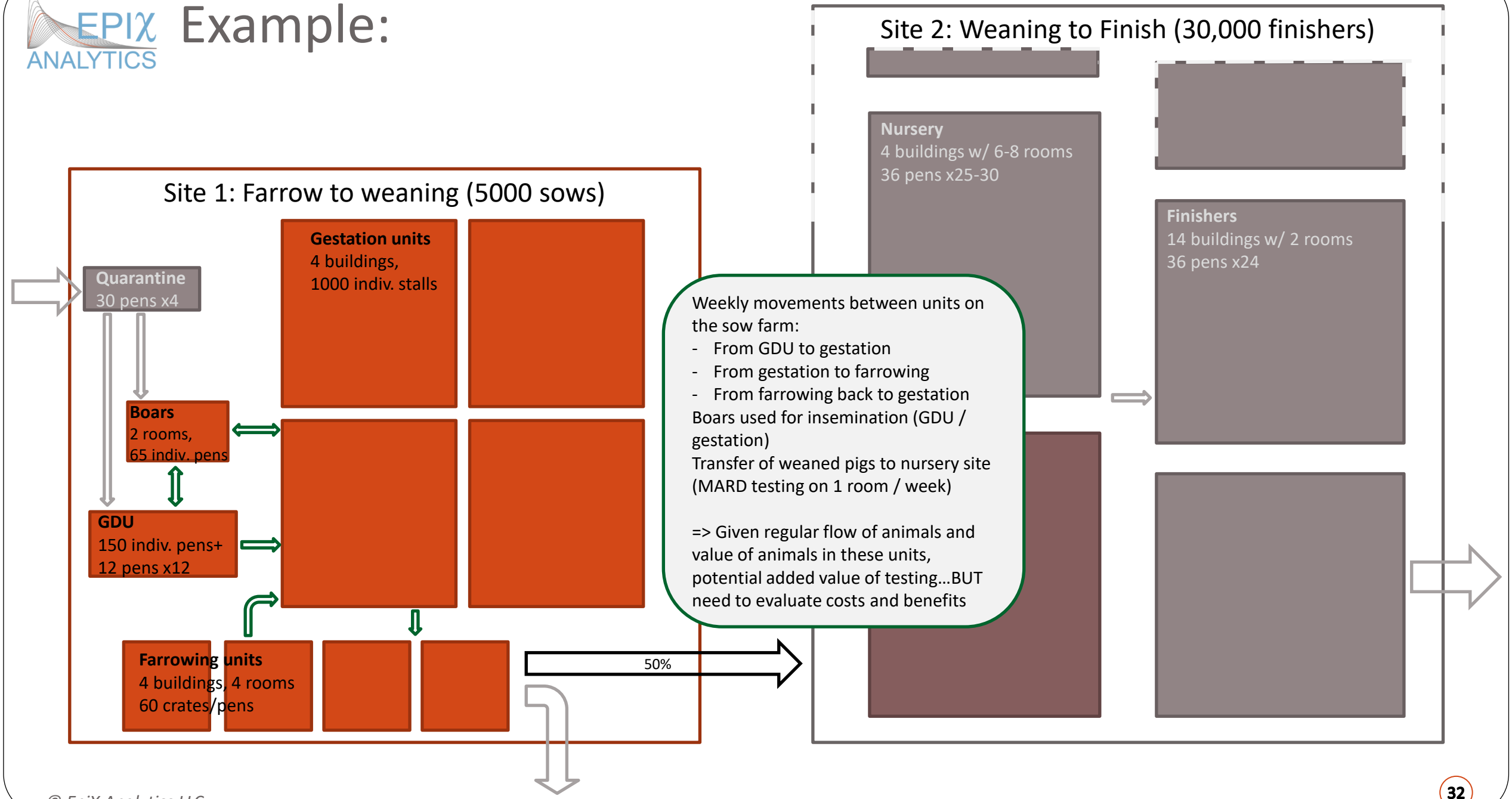


Weekly movements between units on the sow farm:

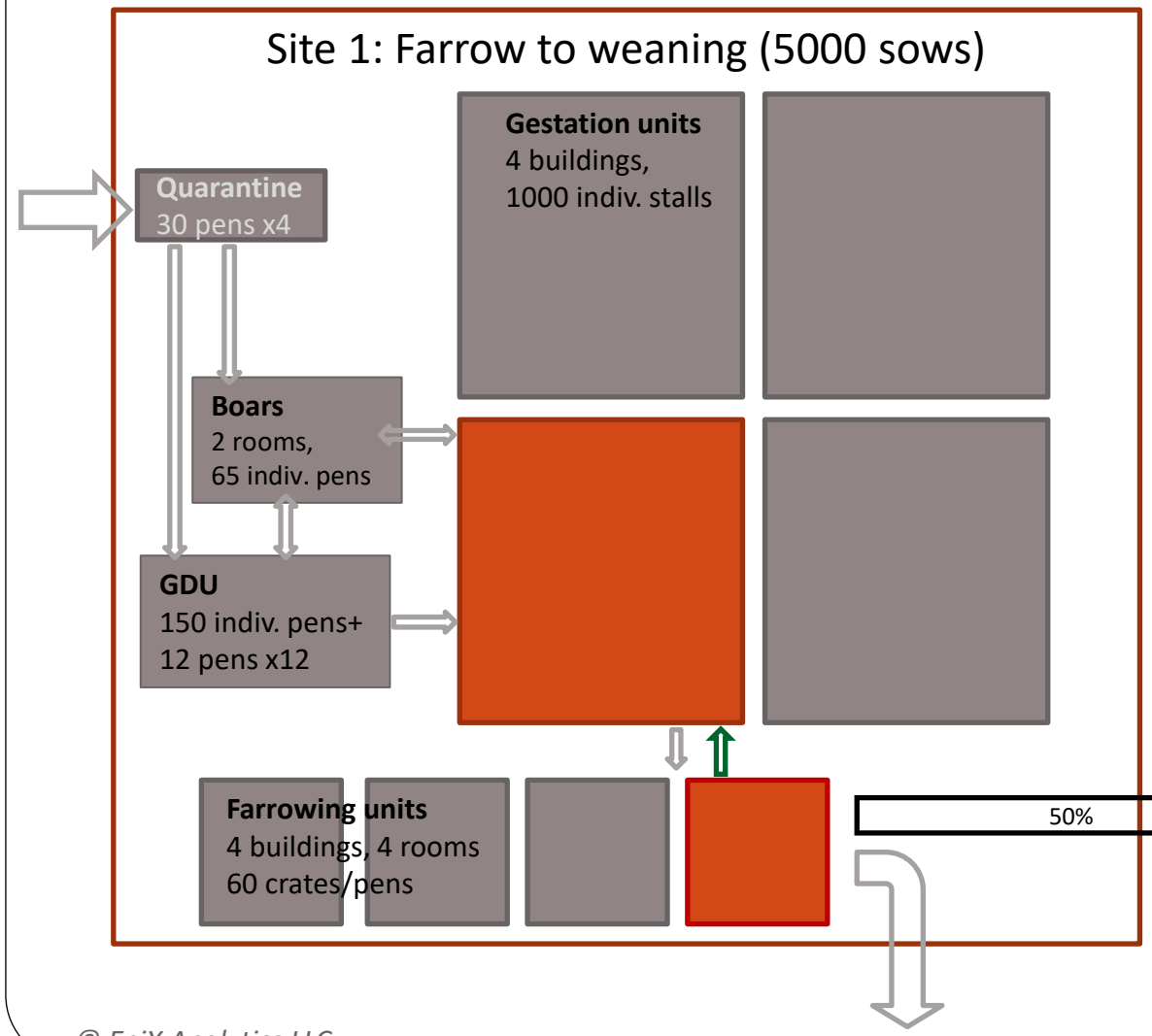
- From GDU to gestation
- From gestation to farrowing
- From farrowing back to gestation

Boars used for insemination (GDU / gestation)

Transfer of weaned pigs to nursery site (MARD testing on 1 room / week)

=> Given regular flow of animals and value of animals in these units, potential added value of testing…BUT need to evaluate costs and benefits

Scenario: in addition to daily clinical monitoring, testing in farrowing building the day before transfer of: ≈240 sows to gestation building, and ≈ 1500 weaned piglets to nursery



MAIN COSTS:

- Screening tests:
  - Sample size depends on test sensitivity and desired detection & confidence level
  - Cost of testing: kits, lab equipment, facilities and staff, etc.
- False positives: depend on test specificity and require running confirmatory test(s)
  - Cost of confirmatory testing
  - In some cases, cost of having to wait for confirmation past the planned date when move planned (production costs)

Costs / week	Ag pen-side	
Tests/wk	135	
Costs/test €	4.73	
Testing costs		**$639**
False positives	21	
Costs/confirm. Test €	16.50	
Follow up testing of false-positives		**$347**

Costs / week	Ag ELISA	
Tests/wk	115	
Costs/test €	5.14	
Testing costs		**$592**
False positives	6	
Costs/confirm. Test €	16.50	
Follow up testing of false-positives		**$99**

MAIN BENEFITS:

- Value of animals whose culling is prevented
  - Here sows (1000-240 from the unit), but also
  - Also weaned piglets (6500/7000 – 2800/3000 from unit)
- Value of continued business
  - 'Saving' litters from pregnant sows
  - Time to restock the gestation unit to full capacity, and loss of gestations over a period (up to 115d+30d+115d)

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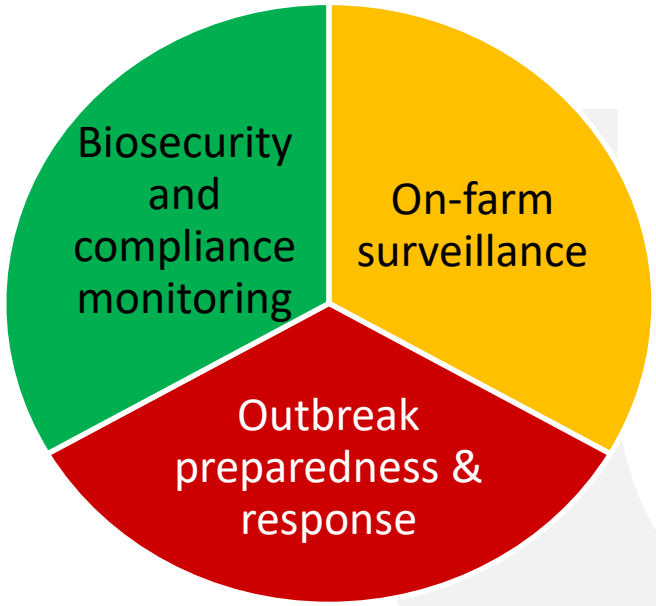
Partitioning - Phase 2: what's next?

- As we finish this 'introduction' phase, next step is to help VN pork industry achieve and implement these ideas
- ASF: challenge for VN pork industry, but can also be an opportunity to innovate, grow, and become international leaders in ASF control
- ASF "here to stay", but sound biosecurity, surveillance & preparedness help manage the risk and can maintain efficient production despite endemicity
- Partitioning will provide a competitive advantage:
  - Novel program: cost-benefit basis for optimal testing and management strategies
  - Participating farms on the cutting edge of adopting a system of maintaining efficient production in an ASF-endemic area

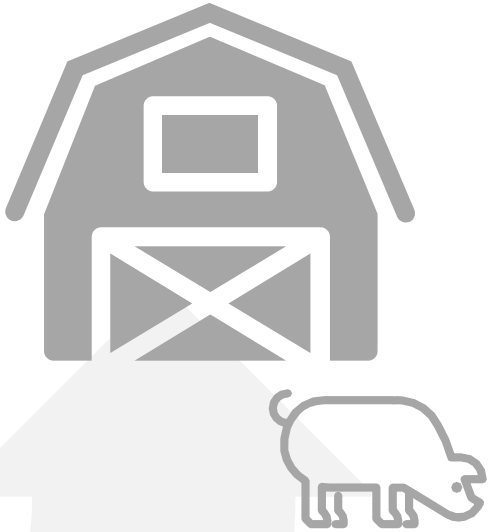
Partitioning on my operation



Guidance on:
- compliance checks for biosecurity
- Sources of information on biosecurity and best practices

Decision-support tool for on-farm surveillance:
Cost effectiveness of testing animals added on to clinical monitoring
- For different production units
- For different tests: sample size, costs, etc.

Guidance on:
- Action in case of positive test result
- Measures to prevent ASF spread to other units
- Approach to document freedom of disease on other units, and resume/continue business



Mitigate ASF introduction risk

Contain spread & limit losses in case of incursion

Resume/continue business swiftly

How to be involved?

We need your inputs and guidance to maximize the usefulness of this system. This requires:

- Regular communication (monthly) over the next 6-9 months to share questions and review and use results for your farm
- Sharing some basic information with our team about your operation (confidentially)
- Ability to directly affect the key questions to be addressed, and solutions to be developed
- **First access to the system (VN is first place where partitioning will be implemented)**

- We will follow up with you individually over the next week to discuss more details

Information needed for farm-level plan (to be handled confidentially)

- General structure and flow of animal movements on farm (to calculate sample sizes and optimize surveillance)
- Some limited farm-economic information, e.g. relative importance/value of animal stages (to prioritize surveillance)
- Current SOPs (to tailor program) for production and current clinical surveillance
- Operational costs of surveillance (to optimize cost-effectiveness)

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